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Tunnel Grouting at Cobble Mountain
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Garbage and Refuse Incinerator at Winston-Salem
New Activated Sludge Plant for Cleveland
Gang-drill Trucks Used to Deepen St. Marys River
Drydock Repair at Puget Sound Navy Yard

December 31, 1931

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F. E. Schmitt, Editor

DECEMBER 31, 1931

✦

Rebuilding

IN A DAY or two everyone may congratulate his neighbor and himself on the passing of a bad year, 1931, unlucky and unhappy for most of us. The new year promises to be of different character. It is destined to be marked by revival and rebuilding, for stagnation has tried men's patience most thoroughly, and now that liquidation and pessimism have run their course all is ready for the beginning of new activity. Scattered signs of fresh energy that have been appearing of late indicate that this beginning is near at hand. Remnants of the forces of contraction remain to be reckoned with, as well as the discouragements of a severe unemployment winter, but it needs no prophetic gift to tell that these cannot be lasting influences. Virtually every business organization is stripped for action. Those priceless attributes of life, courage and confidence in the future, have not been lost to us, and tempered by prudent caution they urge irresistibly forward toward reconstruction.

Individual Effort

RECONSTRUCTION suggests that the old pieces are to be put together again in the old way, but this is not likely to occur. What the times demand is better described as building up anew from the foundation. People who still talk of "getting back" to normal instead of getting forward overlook the two long years that have elapsed since the breathless prosperity days of '28 and '29. Normal is a state that lies ahead rather than behind us. Old organization, methods and machines are sure to be at a disadvantage in reaching that objective. No wonder-remedy has evolved from the discussion of depression and stabilization to warrant a belief that the year's progress can be built otherwise than through individual effort—brains, skill and hard work, 1932 model. It has been reported that the men and companies that succeeded best in the past year's struggle were those that created new and useful things and worked hard to bring them to recognition; if so, it is apt to be even more the case in the coming year. It applies to the engineering arts as much as to any; for, though dependent largely on the wants of others, they are more subject than most arts to the test of the old virtues of truth, utility and efficiency.

Levee Labor Not Mistreated

THE investigation of working conditions on the Mississippi River levees by Gen. Lytle Brown, Chief of Engineers of the army, discloses no such exploitation and abuse of labor as has been charged by the American Federation of Labor. A close inquiry found that in some cases the wages of common labor were relatively low and in isolated cases the hours of labor were unreasonably long. It found in some cases that purchase at the contractor's commissary was made a condition of employment. Orders have been issued that will correct these occasional instances of abuse. In no instance was it found that violence had been offered to the men or that they had been constrained in their freedom to work or to live where they chose. These findings are in accord with observations made by an editor of this journal during an inspection in November of most of the levee operations from New Orleans to Memphis. Following closely on the committee report denying the charges of organized labor that neglect and abuse of workmen prevailed on the construction operations at the Hoover Dam, the report of the levee engineers strengthens belief that labor officials have been more interested in discrediting employers than in discovering the truth. This is particularly unfortunate at the present time, when lack of employment leaves labor in special need of sympathy and help. Its misfortunes are great enough to need no magnifying, and false charges will only prejudice the public against claims deserving of complete and hearty support.

AN INDEX to Engineering News-Record for the half year just closing, July-December, 1931, will be included with the issue of Jan. 14, 1932.

Civic Thrift

AN ADVERTISEMENT recently brought to the notice of its members by the Engineering Institute of Canada leads us to suspect that some parts of the province of Ontario were settled by the Scotch. It is a canny advertisement, revealing a clever way of keeping down city expenditures in Oshawa. Oshawa has or expects to have a population of 40,000, and needs a sewage-disposal plant. But plans for such a plant cost money; unless—bright thought!—the spirit of friendly rivalry among engineers can be counted on. This latter thought is the key to the Oshawa scheme. "Up to 12 o'clock Monday, Jan. 4, 1932," according to the Institute, the city clerk will receive competitive plans and specifications for a sewage-disposal plant (complete treatment) to take care of the 40,000, the plans to be complete with dimensions and quantities, to be accompanied by a contractor's bid, and to be approved by the provincial department of health. The advertisement does not suggest that a contract is to be awarded or that any obligations are to be incurred; but it does make clear that plans are wanted "free of cost to the city." With very proper caution, perhaps suspecting that these free-of-cost designs may not be so good, the officials give warning that the Council reserves the right to reject any or all of the designs submitted. The Institute counsels its members to refrain from taking part in any such competition. We are inclined to think this counsel wise, all things considered.

Advance in Drilling

EXTENSION of gang drilling to open ledge excavation has been accomplished with brilliant success in deepening the main ship channel of the St. Marys River. Combining the expedient of operating a number of drills from the same stand, as in recent drill carriages for tunnel work and drill boats for subaqueous rock excavation, with that of mounting drills on wagons as heretofore practiced in core and well work, the equipment engineers produced a gang-drill motor truck. The performance of this new equipment unit as recorded on another page is proof of the sound mechanics exercised in assembling it and of intelligent perception of the opportunity for mobility and repetition of operations afforded by the smooth and even ledge surface of the old channel bottom. The outstanding elements of the combination—mobility and multiplication of points of attack—reflect recent trends in equipment engineering which open up wide horizons of inventiveness and usefulness. The individual operation of tools, even those so highly perfected as the rock drill, does not adequately meet the requirements of speed and volume in construction. Group combinations are necessary to provide mobility, and individual units have to be assembled into trains which multiply operations. In this task equipment engineering has endless opportunities for contribution to the art of construction.

Better Concrete Control

IN COMPARATIVELY recent years concrete mixing and placing has run a diversified course from the old hand-tamped and dry-rodded practice, down through sloppy mixtures and often haphazard proportioning, back to scientific design of mix and close control of manufacture. In this last stage it still suffers from the weakness of uncertain field proportioning, inevitable so long as the control of mixing remains with uninterested or inexpert workers. Recognition of the necessity of carrying the design principles through the actual mixing of concrete has been apparent on several recent notable dams, such as Calderwood, Bull Run and Diablo. A distinct further step in the technique of mixing and proportioning is now exhibited by the methods used at the Thomas W. Koon dam, near Cumberland, Md. Ingenious semi-automatic equipment here produces concrete of mixture and quality designed. The predetermined proportions of ingredients are assured within 1 per cent of variation. The water-ratio is held uniform with ease by aid of a quick and simple determination of the moisture content of each aggregate, which can be made for every batch if desired. Finally a graphical record of the actual proportions in each batch is available to the engineer. The improved control of results thus obtained is valuable because concrete cannot reach the high degree of permanence and durability of which it is capable unless it is actually made in accordance with its design—and, of course, unless the design is correct. Thus the methods described may introduce a new era of concrete production.

Courting Bureaucracy

IN ITS recently drafted bill of particulars for restoring business and relieving unemployment, the Associated General Contractors urges the licensing of contractors. A committee is to bring the question formally before the whole membership at the annual convention to be held in January. By its action the association throws open for discussion the heretofore local question of licensing as a national policy of the contracting business. In this aspect the plan is of concern to all elements of the construction industry. Financing, engineering and manufacturing are equally interested with contracting. And by no means least, the interests of the public, the buyer of construction service, are at stake.

What is the situation of licensing? Experience with its practice has been limited. Its results, in tangible terms, are far from clear. The reasons why it has been sought are not convincing. That contractors generally believe in the desirability of licensing has not been shown. Even if licensing of contractors could be immediately achieved, it would hardly help in restoring business or relieving present idleness.

Licensing of any business or occupation is justified only by the demands of public safety or necessity. No other warrant exists for limiting the freedom of individual participation in business or craftsmanship, or for demanding a legal test of ability to perform service. Does public safety or necessity call for the licensing of contractors? Yes, say those who have advocated license legislation; but their claim is mere unproved assertion. In no instance has convincing evidence been presented that the public has suffered in safety or health or comfort from conditions which licensing would have removed.

Even admitting that licensing would perform a public service, is anyone confident that the practical difficulties of carrying licensing into effect can be met? What operations are to be subject to license and what not? Is the dollar value of the work to be the measure? Shall the difficulty of the work control? Is personal skill—an elusive matter where corporations are concerned—to be judged? These questions are typical of the difficulties involved in the practical application of licensing. No doubt they can be answered if real grounds for licensing exist, but they should not be overlooked at this time. However, as previously stated, the essential agreement rests on public interest. Only when organized contracting makes out a case for public safety will it be able to justify licensing. It has nowhere done this.

The fact of the matter is that the eagerness of contractors to support license legislation has not been prompted by any demand of the building public for protection. It has originated solely in conditions existing within the contracting business. Various influences have acted to fill the ranks of contracting to an unusual extent with men not financially sound and lacking in experience and ability. Their competition has been ruinous. To combat this element of their business contractors have turned to the possibilities of restrictive legislation.

Thus, to remedy a bad internal condition contracting proposes to resign its freedom of action and place its destinies in the hands of a government bureau. The government is to say *who* shall engage in construction as a contractor. If the history of bureaucratic control repeats itself, the government would soon be dictating also *how* contracting shall be conducted. This is the contingency that contracting is inviting because it shirks the task of reforming its own business. A more virile spirit is needed if its old traditions of resourcefulness and direct action are to be preserved. Licensing, in our opinion, is not the way out of its difficulties.

Overwrought Nerves

IT IS an old human experience that good principle does not always survive unscathed in time of stress. An individual whose nerves are overwrought may do things he would not do in a normal state of mind; and so with business and governments. That may be the reason for a strange development in our own current history: A dozen or more of our sovereign states have passed laws which circumvent the intent of the Constitution to keep commerce between the states free and unrestricted—that great basic principle which has brought the United States to its magnificent industrial and commercial development and is the foundation of our very being.

In typical form these laws prescribe that in public works built by the state "preference shall be given to materials produced in the state," but they include interesting variations. One state directs that state purchases shall give preference to local *dealers;* others give preference to *citizens* of the state. Some are mandatory, some permissive, at least in form. Usually the law disclaims a price preference, but one state sets up a five per cent and another a ten per cent differential in favor of certain home products.

Many of these laws were born of 1931 conditions. In fact, one state specifically justifies the preference by unemployment, and accordingly directs state officials to give preference "during the present period of unemployment" to articles made in the state. But some of the laws are much older, and are evidently not motivated by hard times. Whatever the reason, these states are essaying to throttle business by thinly veiled embargoes. Were these laws other than an outgrowth of overstrained nerves they would brand the states as backward and incompetent: incompetent because they are unable to compete, and backward because they are not willing to modernize and meet competition.

Restrictions of the same general nature are also applied otherwise than through legislation. Public departments and bureaus in some states have set up local-origin requirements in their purchase orders and specifications. Elsewhere, buy-in-the-state movements are carried on by publicity agencies. Still other states resort to taxation of out-of-the-state products that compete with equivalent but slightly different home products. The same cunning purpose animates all these devices: to foster home production temporarily by stealing a march on other states; it is obvious that once the same stratagem is adopted by these other states it becomes futile.

The bright side of the picture is that only a small minority of our states have tried thus to cripple the country's economic unity and set themselves up as petty commercial principalities. Most of the states have managed to preserve their sane outlook; for this let them be warmly commended! Their example is full warrant for the belief that preference legislation will disappear from the statute books as soon as overwrought minds have returned to normal. For the business man as a type is too clear-seeing to encourage destructive restrictions.

Relief Through Public Works?

CONFLICT of opinion in high places rages around the proposal to relieve unemployment by a great program of public works financed by the federal government. The proposal has been before the public for many months; among others this journal strongly urged it last summer, when there was still time before winter to plan the works and the necessary organization. At all stages sharp difference of view concerning the proposal was evident. Its opponents said that it is unworkable, and that in any event the relief of unemployment is the concern of private business, not of government. But there has been no clear and full study of its effect on unemployment and public welfare. Present developments may bring this long-needed study.

The new clash of opinion arises within the government itself. It will be recalled that the President, opposing public-works relief, set up the Gifford committee to see that local charity was organized for relief and to stimulate other aid activities where possible. The Garfield committee, part of this organization, was directed to consider public works. It now reports that in its opinion public works cannot help against unemployment. On the other hand, Senator La Follette, holding the opposite belief, last week introduced a bill in the Senate to establish a Public Works Administrator and appropriate 5½ billion dollars for his use in immediate public-works construction as a means of employing the idle and beating the depression. When the Federal Reserve index of industrial activity reaches 100 the administrator is to cease functioning, but until then he is to take over the Bureau of Public Roads, the Supervising Architect's office, the Bureau of Reclamation, and the army engineer work other than military operations.

The subject is of first-rate importance, and yet past discussion has been confined largely to statement of belief, usually dogmatic and unreasoned. More painstaking scrutiny is in order. Would the plan work?—this question is well worth examining. Is it harmful, or so bad in principle that the jobless must continue jobless until private business can regain its footing? This question equally deserves even-tempered discussion.

Though the Garfield committee refrained from discussion, it doubtless has definite reasons for its views, since it is made up of able men—few men are clearer thinkers than the former Secretary of the Interior, its head. On the other hand Senator La Follette's ability and experience in public life are assurance that he too has excellent reasons for believing that unemployment can be relieved by expanding public works. It is to be hoped therefore that his bill will be the subject of thorough discussion in Congress. If such great crises as the present must afflict the country's workers, and if both business and the government declare themselves helpless to prevent or alleviate it, it is imperative that the possibility of making expansion of public works serve as a remedy be thoroughly analyzed by Congress.

That such expansion will provide a remedy cannot be proved definitely without a trial because of the magnitude of the factors involved. But Congress can at least establish the fundamental facts bearing on both sides of the question, not only for its own guidance in acting upon the La Follette bill but also for the guidance of others should the same problem arise in the future. Dogmatic statements must give place to cold facts before a logical answer can be made to the question as to what relief may be obtained through public works.

Precise Concrete Control at Koon Dam

Semi-automatic batching and mixing plant installed to meet rigid concrete specifications —Dry mix requires tamping with vibrators

To meet a set of unusually rigid concrete specifications on the Thomas W. Koon Dam being built to provide additional water storage for Cumberland, Md., the contractor has installed a most modern batching and mixing plant that is semi-automatic in operation. A push-button control starts the concrete ingredients flowing into the weighing batcher, and a photo-electric cell cutoff stops them with unerring accuracy. The weight of each ingredient in every batch and a time schedule of every operation in the concrete plant, through charging, mixing and discharging, is automatically recorded on a chart, providing a permanent record of every batch of concrete.

The consulting engineers wrote the specifications with a determination to get a uniformly high-grade concrete to meet the design requirements consistently. Experience with the plant has shown that desired results are being obtained to a most satisfactory degree. The extremely dry mix is being deposited from special straight-side dump buckets and is tamped into place by electric vibrators, similar to the system used by the Aluminum Company of America on its Chute à Caron and Calderwood dams (*ENR*, Oct. 24, 1929, p. 640).

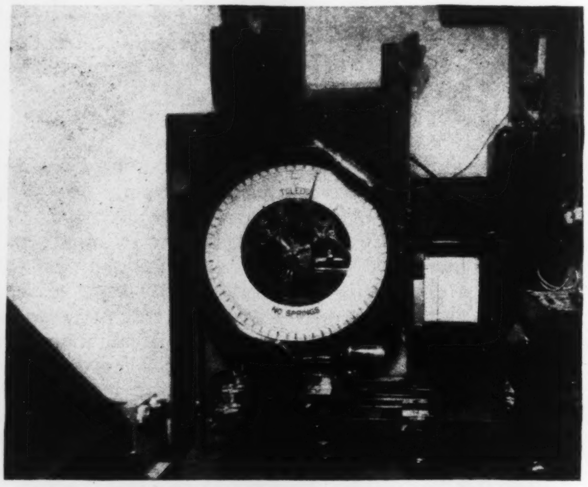


Fig. 2—Weighing apparatus for precise concrete control
Each ingredient is weighed separately by running the poise out on one of numerous scale beams to predetermined weight. Panel board at left carries push buttons for control of each ingredient entering batcher. Automatic photoelectric cell cutoff to stop flow of aggregates can be seen on dial rim to right of top. Graphical recording chart is at right of scale dial.

Design of Dam

The dam lies in the valley of Evitts Creek, Bedford Co., Pa., 12 miles north of Cumberland, at the headwaters of Lake Gordon, the present water supply of the city. The project is being built to provide an additional 2½ billion gallons of storage in a reservoir at a level of 67 ft. above Lake Gordon. The dam (Figs. 1 and 3) is of the concrete gravity type, about 92 ft. maximum height and 726 ft. long. Four overflow sections are provided, each 66 ft. wide, two on either side of a central non-overflow section 34 ft. wide, which contains the outlet control works. The outlet gate house projects upstream from the base of the dam. Water drawn from storage will be taken through the gate chamber and discharged into Lake Gordon through two 24-in. balanced needle valves.

Concrete Specifications

After studying the results obtained by the use of dry large-aggregate concrete in large dams of recent construction, the consulting engineer prepared concrete specifications for this dam, which provided for the use of coarse aggregate as large as could be handled through a 2-yd. mixer. Vibrating puddlers were specified in order to place the resulting harsh mix properly.

There are three classes of concrete in the dam, totaling 72,000 cu.yd. The main mass in the dam is designed as a 2,500-lb. concrete, using only large aggregates and sand, the stone ranging from 3¼ to 6½ in. There is also a small yardage of 3,000-lb. concrete, 2½-in. aggregate

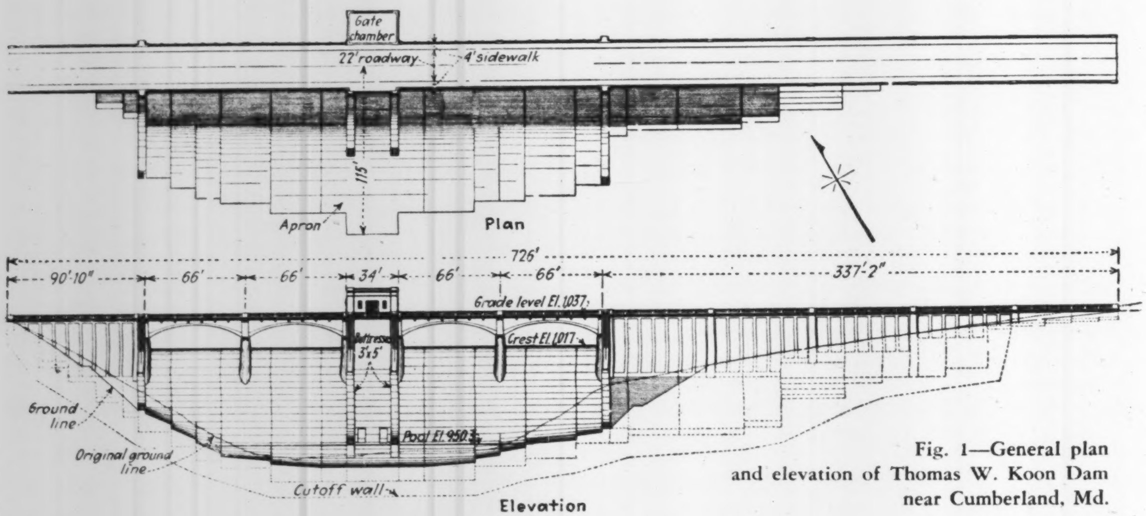


Fig. 1—General plan and elevation of Thomas W. Koon Dam near Cumberland, Md.

being used as a maximum, and 3,500-lb. concrete, limited to $\frac{3}{4}$-in. aggregate.

The specifications also provided that all concreting operations should be under the direction and control of a concrete technician. This concrete technician, under the supervision of the consulting engineers' representative, is entirely responsible for the quality of concrete entering the structure. The specifications also provided that the contractor establish a completely equipped field laboratory for the testing of concrete, cement and aggregates.

The extent of the control of concrete on this project is indicated by the following excerpts from the specifications:

> *Measurements*—The amount of cement and the fine and coarse aggregates used in each batch of concrete shall be determined by direct weighing equipment complying with the following requirements:
>
> (*a*) The accuracy of the weighing equipment shall conform to the requirements of the United States Bureau of Standards.
>
> (*b*) The equipment shall include a visible dial or equally suitable device that will accurately register the scale load at any stage of the weighing operation from zero to full capacity.
>
> (*c*) The equipment shall include an accurate automatic recorder, capable of being locked, for visibly and graphically recording the time of weighing and the actual amount of each separate ingredient weighed out.
>
> (*d*) The equipment shall be capable of ready adjustment for compensating for varying weights of moisture in the aggregates or for changing the proportionate batch weights.
>
> (*e*) The equipment shall be capable of controlling the delivery of material for weighing to within 1 per cent of the specified weight for cement and 2 per cent of the specified weight for each of the separate aggregates.
>
> (*f*) The equipment shall be so arranged as to permit the convenient removal of overweight material in excess of prescribed tolerances.
>
> The amount of water shall be changed as required to secure concrete of proper consistency and to adjust for any variations in the moisture contained in the sand and other aggregates as they enter the mixer.

The 2-yd. mixer used required the design of the weighing equipment to be based on the approximate proportions of materials as follows: sand 2,400 lb.; coarse aggregate, 4,500 to 5,000 lb.; cement, 1,200 lb.; water, 500 to 600 lb.; total, 9,000 lb.

Coincident with the preparation of the plans and specifications for this dam, Sidney F. Mashbir, manager of the concrete aggregate division of the Toledo Scale Co., in conjunction with H. H. Allen of the J. E. Greiner Co., consulting engineers on the project, developed equipment to meet the requirements above outlined.

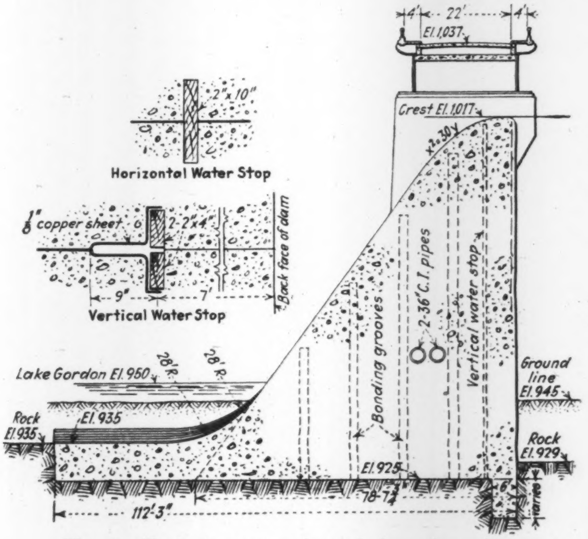


Fig. 3—Typical cross-section of dam through one of spillway sections

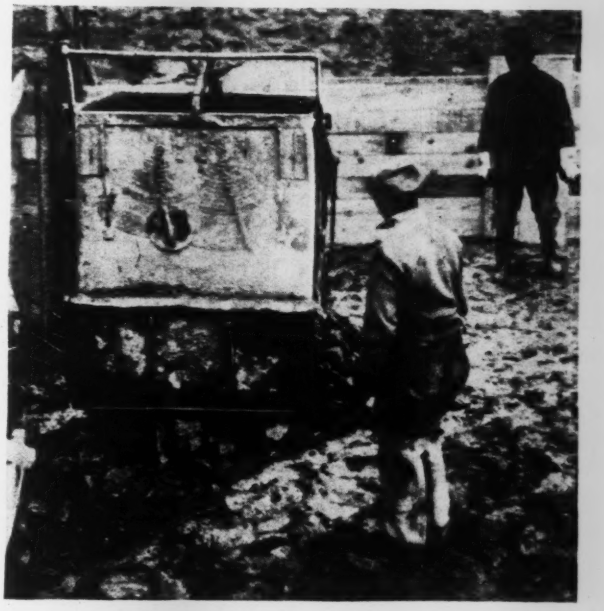


Fig. 4—Extremely dry mix of large-aggregate concrete piles in heap when dumped from special straight-side buckets

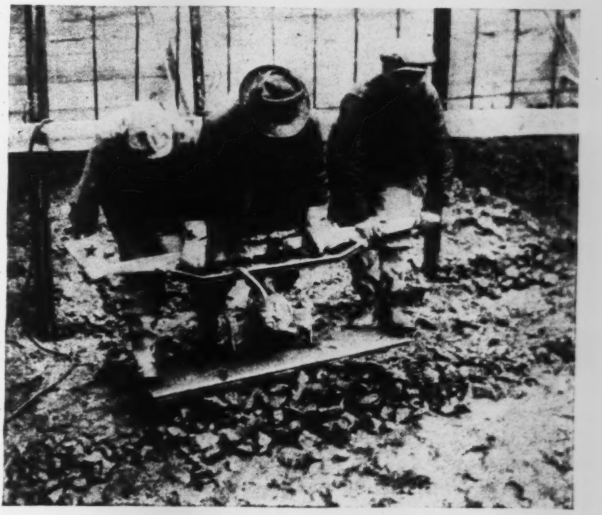


Fig. 5—Electric vibrator handled by three men quickly tamps each batch of dry concrete into a mass homogeneous with that previously deposited

The scale head of the weighing unit is equipped with a visible full-automatic springless dial 20 in. in diameter graduated for 5,000 lb. by 5-lb. increments, with a guaranteed accuracy of 0.1 per cent. To this dial is attached a graphic continuous strip recorder, on which ordinates represent time in minutes, and abscissae represent weights. This recorder is locked to eliminate the possibility of tampering and shows for each batch the actual weight of water, cement, fine and coarse aggregates, with provision for two extra-sized aggregates, if required. When compensation for moisture in the aggregates is necessary, the scale is arranged to record the weight of

Fig. 6—Crushing, screening, batching and mixing units are all located in one compact plant

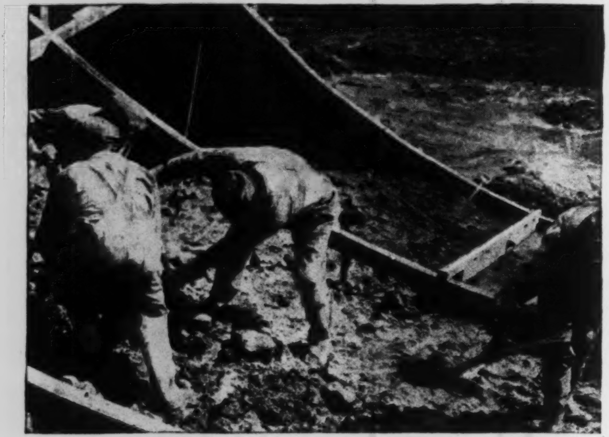


Fig. 7—No forms are used for top of curved downstream toe sections. Instead, the concrete is screeded to proper curve with aid of guide timbers. Face is finished with wood float

moisture in any of the aggregates, determined directly as noted below. It also records the elapsed time between batches and the time of proportioning each batch, thereby forming a complete inspection record never before available in the manufacture of concrete.

The hoppers for the cement and aggregates and a tank for water are balanced on the scale head by a single set of levers. The scale head is equipped with three double-weigh beams and six poises, one for each of the usual four ingredients, and two extra to take care of additional sizes of fine or coarse aggregate. In addition, the beam and dial are equipped with an apparatus for determining quickly and accurately by weight the surface-moisture content of any three of the concrete aggregates that are used. The time required for the determination of the moisture content of each separate aggregate is but 40 sec., sufficiently short to permit of these determinations and for compensation therefor in every batch of concrete if required. This equipment affords an absolutely accurate weight control of the water-cement ratio. A duplicate of the scale head and beams is established in the concrete laboratory for the determination of specific gravities, the percentage of water absorption and for making sieve analyses.

Operation of Weighing Apparatus—The entire charging and weighing apparatus is controlled by one man. Sand and stone are each discharged into the weighing batcher by belt conveyors, the belts being controlled by push buttons in the scale room. The cement, discharged into the weighing batcher by a screw conveyor, is also controlled by a push button on the same panel board. Water for the mix is controlled by a valve operated by the scale man. The operation of the apparatus, shown in Fig. 2, is as follows: The operator moves a poise out on one of the scale beams to a predetermined weight of sand. He then hooks onto this poise additional weights, calibrated by percentage, to compensate for the moisture in the sand. As the poise is moved out, the indicator on the face of the dial moves in a counterclockwise direction to the figure on the dial corresponding to the weight at which the poise plus the moisture-compensation weight are set. The operator then pushes a button starting the sand belt running. As the sand enters the hopper, the indicator on the dial moves toward zero. The instant this counter reaches the zero mark a photo-electric cell arrangement cuts off the motor driving the sand belt, thereby stopping the discharge of sand into the batcher bin. Leaving the poise on the sand beam in place, the operator next moves another poise on another beam to weigh out the coarse aggregate. If compensation for moisture is required, the additional weights are added, the same as for the sand. Pushing another button starts the belt carrying the coarse aggregate to the batcher bin, and when the indicator arm on the dial reaches zero the motor current is again shut off.

The procedure is repeated for cement, which is likewise cut off by the automatic stop. The operator then dumps the entire charge into the mixer. In the meantime all material that has entered the hopper has been recorded according to weight on the moving-strip recorder along with the time required for each operation. The photo-electric-cell equipment operates independently of the weighing mechanism, thereby eliminating errors of friction in the mechanism and resultant incorrect weights.

Crushing and Mixing Plant

Source of Aggregates—Rock for both coarse aggregates and manufactured sand is obtained from a calcareous sandstone quarry opened up in the creek valley about 3,000 ft. above the dam. Gas shovels load the rock into 5-yd. narrow-gage cars, which are hauled to the crushing plant at the mixer by steam dinkies.

Tests have shown that for this particular case an ideal sand gradation is obtained by using a mixture containing 65 per cent manufactured sand and 35 per cent riverbank sand. Therefore, a mixture of sands as close to these proportions as possible is used. The bank sand is delivered by truck to the job.

Bulk cement is used entirely. The cement received by rail at Cumberland is unloaded by cement pumps and stored there until ready to be trucked to the job in covered dump trucks.

Crushing Plant—At the central plant quarry-run rock is dumped into a primary jaw crusher, reducing it to 6½ in. A 30-in. belt conveyor takes the product of the primary crusher to a set of vibrating screens. Here the stone larger than 3¼ in. is screened out, passing directly into the coarse-aggregate storage bin. The rest passes into the small-aggregate bin over a ⅝-in. vibrating screen, cleaning out the small rock, loam and silt, which is wasted. Chutes permit rock to be fed from the large-

and small-aggregate bins into a jaw-type crusher, which reduces the stone to a smaller size, either for the higher-strength classes of concrete or for feeding the two cone crushers in which the sand is manufactured. From the cone crushers the sand is raised by a bucket elevator and passes over vibrating screens into the sand bin, all oversized material being carried back to the cone crusher by a gravity feed. These last screens also separate out all dust, which is wasted.

Mixing Plant—The aggregates are carried from the storage bins to the batcher bin by two belt conveyors, one for stone and one for sand. The cement is taken from the bulk storage bin to a reserve bin by a screw conveyor. A short screw conveyor carries the cement from the reserve bin into the batch bin. The belts and screw conveyors dump directly into the batcher and operate only when a batch is being charged, being controlled from the scale house. Any material sticking in the batch bin after it is dumped is cleaned out by an electric vibrator fastened to the side of the bin, also controlled by the scale operator.

The batch is mixed in a 2-yd. electric-drive mixer. One man is detailed to dump the mixer; all other charging and mixing operations are controlled by the scale operator.

Distribution System—The mixing plant is located at the west end of the dam on the upstream side. From the mixer an inclined trestle crosses the creek, running parallel to the dam. The concrete is dumped into 2-yd. straight-side bottom-dump buckets set on cars that are pulled across the trestle by a steam hoist. The cars return to the mixer by gravity. Two steam cranes, on 12-ft. gage tracks, operate on another trestle paralleling the upstream side of the dam. Concrete buckets are handled from the cars to forms by these derricks. Additional handling by smaller crawler-mounted cranes is necessary at several points.

As can be seen from Fig. 4, the concrete is so dry that it piles up in a heap when dumped out of the buckets. A few minutes' work with the electric vibrator settles the freshly dumped batch into the main mass of concrete. Three men stand on the vibrator during its operation.

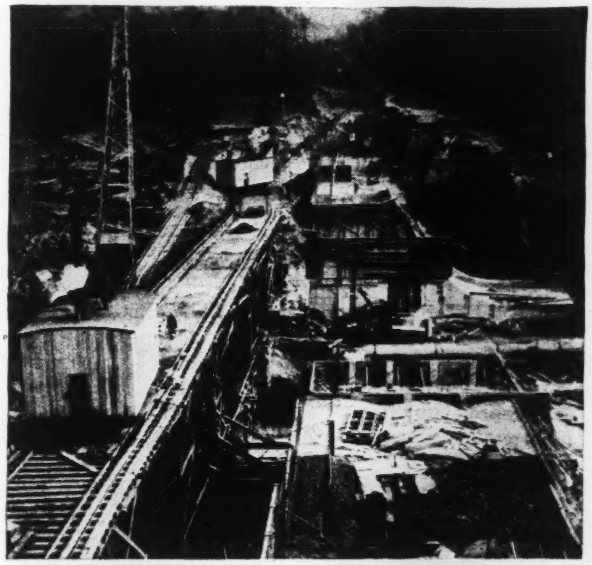


Fig. 8—Two wide-gage steam cranes handle the concrete buckets and forms. Inclined trestle carrying concrete cars can be seen at left of derrick trestle

Pennsylvania regulations require that a concrete with not less than 1.25 bbl. cement per cubic yard be used for a depth of not less than 6 ft. in from the faces of the dam. This concrete is mixed as dry as the other and is vibrated into place. Red metal tags are hung on the buckets containing this richer mix for identification when they reach the forms.

Wood-panel forms are used throughout. No forms are placed on the curve at the toe of the dam. The concrete in this part of the structure is screeded with aid of curved timber guides. Despite the dry nature of the mix, an exceptionally smooth surface free from honeycomb is being obtained, both in the formed and screeded faces.

Stream Control—Earth cofferdams with cores of steel sheeting were built above and below the dam. The streamflow is carried through the upper cofferdam by a wooden flume and through the dam itself by a 66-in. steel pipe. This pipe is concreted in the dam and will later be filled with concrete and grouted.

The contractor is generating his own electric power with a 300-hp. diesel plant and a 150-hp. oil-engine plant.

Contractors and Personnel

The project is being built for the Evitts Creek Water Co. (corporate name for Cumberland's water department). Ralph L. Rizer is city engineer, and C. J. Bruce is superintendent of the water company. The J. E. Greiner Co., consulting engineers of Baltimore, designed the project and are supervising its construction. Prof. John H. Gregory, dean of engineering at Johns Hopkins, was associated with the consulting engineers on the design. William Willoughby is resident engineer for the consultants. The Vang Construction Co., Cumberland, is contractor, with L. E. Goerder and G. W. Smith in charge of operations at the site. R. E. Martin is concrete technician.

Problems Before New Bureau of Agricultural Engineering

ESTABLISHMENT of the bureau of agricultural engineering within the U. S. department of agriculture reflects the significant tendency to consider agriculture as an industry. S. H. McCrory, chief of the new bureau, points out that as the farmer's status is rapidly becoming identical with that of the manufacturer, he must meet the situation by the same means the manufacturer employs.

Constant striving to reduce production costs is the first objective of the bureau's plans as outlined by Mr. McCrory. Many of the major operations of the farm are susceptible to improvement by the application of engineering analyses, and the demand for establishment of a full-fledged research bureau in the department of agriculture came from those who recognized the points of contact of the engineering phases with those of soil chemistry, entymology and other branches of scientific agriculture.

Agricultural engineering comprises three major lines of activity: (1) improvement of the land itself, including irrigation, drainage and the control of soil erosion; (2) farm structures and their equipment; (3) farm power and machinery. Results of research that have been made by various bureaus have been turned over to the new bureau, and the work along these lines will be coordinated and extended.

Pennsylvania Adds Local Roads to State System

Renovation and maintenance of 20,000 miles of township roads absorbed by state introduces complex engineering and financing problem

INTEREST in Pennsylvania road work this year has centered in the renovation of township roads taken over by the state under the authority of the rural road act passed by the 1931 legislature. About 1,700 miles of these township roads were planned for improvement in 1931. The total mileage taken over was 20,000. This mileage, by the law, became state-system highways, which, added to the 13,562 miles of the original state system, increased them to 33,562 miles, making the largest state-road system in the United States except the 55,000-mile system of North Carolina. The selection of township roads to make up the 20,000 miles and the organizing and designing of their improvement have been the outstanding problems of the Pennsylvania state highway department during the past twelve months.

Development of Plan

The act for increasing the mileage of state highways by taking over main township roads had its incentive in popular demand for better local roads. The first state activity in highway development began in 1903 with state aid to counties and townships. In 1911 the legislature created a state system of highways, which was variously added to in succeeding years. Following the creation of the state system a plan of state awards was developed, the purpose of which was to encourage township road improvement by state subsidies. By 1931 the state system had increased to 13,562 miles, of which 10,448 miles had been hard-surfaced and the remaining 3,114 miles had been graded and drained; all 13,562 miles was under effective state maintenance. In addition, under the subsidy plan, the state had had a hand in and an extended acquaintance with progress in township road improvement.

With the state-road system largely improved and with increasing demands for better local roads, the questions were: Should the state roads be raised to higher types of improvement, or should the money be spent for improving local roads? If local-road improvement was decided on, should the money go to the local authorities for their highway uses, or should the state-highway system be increased by adding local roads? The answer to the first question, largely influenced by the belief and the political activity of Governor Gifford Pinchot, was to improve local roads. The second question was answered by the more logical reasoning that absorption of local roads into the state system would generally insure superior administration and engineering and greater resources of equipment and opportunity for purchasing and controlling materials.

Decision on these answers was crystallized by introducing into the state legislature a bill placing in the state highway system 20,000 miles of selected township roads. The selection of the roads taken over was made by the state highway department from its own extensive knowledge obtained through years of state awards for these roads and with the advice of local authorities, motor clubs and good-roads associations. The roads were selected on the basis of their importance as main roads and their connection with improved roads connecting with the state system. The selection was limited also to rural roads, no city or borough streets being included. Altogether, more than 4,600 individual roads were selected and described in the bill by terminal and control points. These roads, by the terms of the act, became the state's responsibility on Aug. 15, 1931.

Broadly, the policy of the state highway administration was to recondition the existing roads as rapidly as practicable, necessarily continuing operations over a term of years, but to place the entire mileage under efficient maintenance from the beginning. A survey of the added roads revealed that a little more than a quarter of the 20,000 miles had been improved in some manner. The maintenance of these roads had, however, been greatly neglected, and the improvements were rapidly going to pieces. To preserve the investment already made, these roads were given preference in the schedule of reconditioning operations. In general, the reconditioning operations are patching and edging, drainage, surface treatment and resurfacing.

In addition to reconditioning already-improved roads, a program was laid out for constructing 1,700 miles in 1931. It was decided to carry on the work largely by department forces. The reasons given for this action were that the late start on Aug. 15 cut the season too short to warrant taking time for letting contracts, and that relief of unemployment was better served by this practice. Construction was started simultaneously in all 66 counties. Only the nucleus of an experienced organization was placed on each operation, and unemployed local men were selected to fill out the crew. Selection was made on the basis of the most needy cases, with preference given to men with families and dependents. Equipment owned by the state was, so far as possible, assigned to the new work, and new equipment costing about $1,500,000 was purchased.

Character of Operations

Of the 1,700 miles under construction this year about 25 miles are being surfaced with cinders or slag, and 450 miles with stone. This surfacing is being done to stabilize the subsoil, and it will eventually serve as a base for an oil-bound or surface-treated macadam that will be constructed later. The rest of the 1,700 miles is light-type oil-bound macadam, usually on a native stone base, and sometimes, in sections where good gravel is available, on a gravel base. The surfacing is being constructed of various widths from 10 to 16 ft., and the roads are graded 22 ft. wide.

Surfacing and grading practice is worked out individually for each piece of road, its construction being determined entirely by the availability of local materials for base and surface courses. For example, in the southwestern part of the state a material known as "red dog," which is a residue of ash left after burning culm from the bituminous coal mines, is being used for surfacing some of the lighter-type roads. This material consolidates thoroughly under traffic, and after being given a treatment of bituminous material it forms a very good surface for light traffic.

In general, the character of construction is also limited by the expenditure deemed warranted. The plan is to keep improvement costs between $4,500 and $6,000 a mile. If costs prove to be running high, curtailments are made in the work. This is one of the reasons why it is not always practicable to ask for bids. Another obstacle to contract work is the additional expense involved in plans, engineering and inspection. If contracts flexible enough to permit changes and adjustments during operations can be arranged, and if engineering and inspection charges can be kept nearly as small as with day labor, contracting the work is considered the preferable policy. So far there has been virtually no contract construction, and contractors have shown little desire to bid under the restrictions and limitations which are in force.

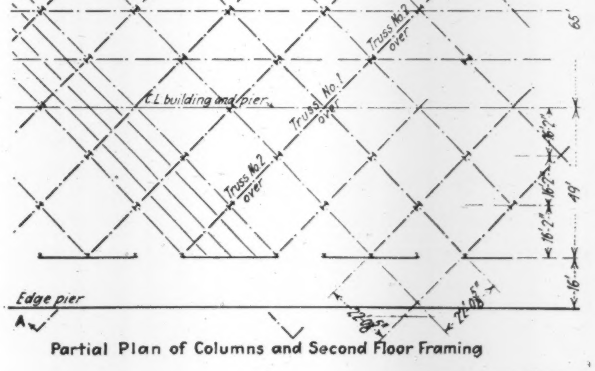
Information for this account of a notable experiment in local-road administration has been obtained largely from Samuel Eckels, chief engineer, Pennsylvania department of highways.

* * *

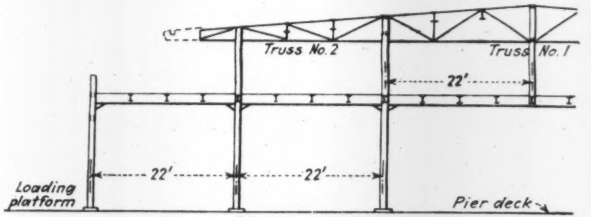
Pier Shed Framing Placed Diagonally for Efficiency

By J. H. KERSHAW
Assistant Harbor Engineer, San Diego, Calif.

IN DESIGNING a new two-story pier shed now under construction on Broadway pier in San Diego, Calif., the writer developed a framing layout that is believed to be unique and to offer important possibilities in similar work. Briefly, the framing plan (Fig. 1) involves placing the floor beams and roof trusses diagonally with the walls of the shed and setting all columns at right angles to the framing instead of to the center line of the pier, except the wall columns, which are set square with the wall, the better to accommodate wall-framing connections. The layout resulted from studies made to devise the maximum freedom for truck movements on the pier and the lightest possible loading, since tests indicated that the old one-story shed, had loaded the concrete cylinder foundations almost to capacity.



Partial Plan of Columns and Second Floor Framing



Half Section A-A Enlarged

Fig. 1—Layout of diagonal framing on San Diego pier

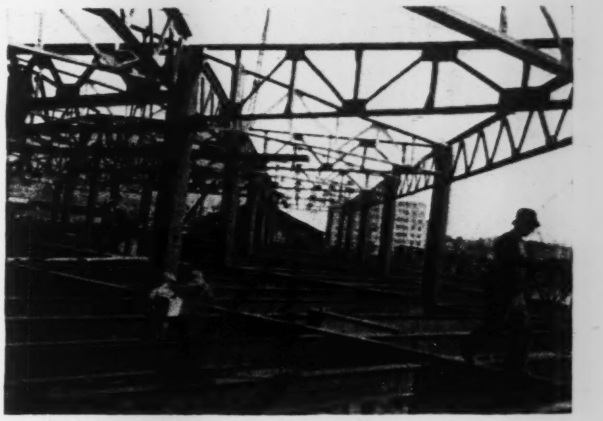


Fig. 2—Diagonal framing provided maximum open areas on floors of pier shed

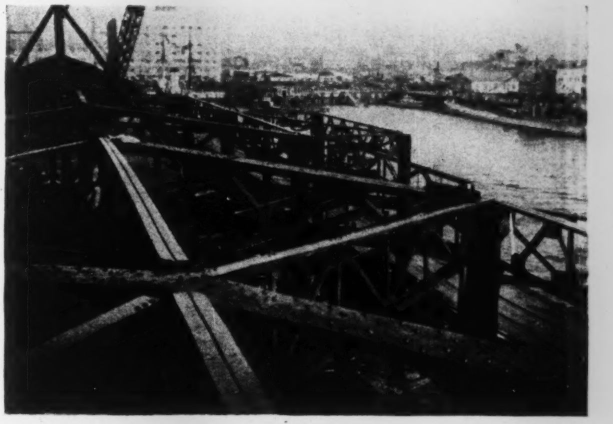


Fig. 3—Framing appears complicated, but all elements are at right angles to columns

The pier is 1,000 ft. long, 200 ft. of which is new construction built in 1930. The old one-story pier shed occupied 735 ft. of the length and had to be removed. Plans for the new shed contemplated a 35-ft. center bay for trucking, and freight bays on either side, 31½ ft. wide. Outside the new shed was to be left a 16-ft. loading platform along either side. First studies were made on the basis of bents at right angles to the walls. The best possible arrangement, however, did not distribute the load on the foundations sufficiently and required different column spacing in alternate bents to maintain the desired freedom for truck operations. By shifting the columns of this layout slightly they were made to line up diagonally, and all spans were made alike in either diagonal direction. This plan involved the use of hangers from the roof trusses to carry the second floor over the center or driveway span.

This framing plan provides maximum freedom of movement on the floors of the shed, together with sufficiently short spans between columns to be economical. Thus the column spacing is 30 ft. longitudinally of the pier and 22 ft. diagonally. It is estimated that this framing plan saved $2,100 in labor cost over a right-angle framing plan because of much simpler substructure alterations. It also requires 104 tons less steel or an additional saving of $8,840, reduced the load on the heaviest loaded cylinder by 17½ tons and reduced the deflection in the long span members in the second floor.

Erection of the pier began Sept. 5 by the Lynch Construction Co., of San Diego, Calif.

Seawalls Protect Florida Coast Property

Beach Protection is a major engineering problem along much of the eastern, western and southern boundaries of the United States. Seawalls, while usually somewhat expensive, are often the best and only solution for a beach erosion problem. In this article two curved-face seawall designs, recently built in front of private property near Palm Beach, Fla., are described. One was constructed in place behind a cofferdam wall, while the other utilized precast members in combination with a poured slab. —Editor.

Poured Concrete Seawall and Groins Reclaim Lost Beach

By FRED E. ZURWELLE
Zurwelle & Whittaker Co., Consulting Engineers, Miami Beach, Fla.

A gravity-type concrete seawall in combination with a series of groins constructed during the past year has assisted in reclaiming a substantial piece of land on the estate of Robert R. McCormick, on Boynton Beach, near Palm Beach, Fla., and to date has operated efficiently in forming a new sand beach along its entire length of 2,050 ft. The wall is of the receding curved-face type of full-gravity section, resting on 1,500 wood piles, and was poured in place in the dry, a permanent steel sheetpiling cutoff wall at the toe forming an effective cofferdam. The wall utilizes 3.15 cu.yd. of concrete per linear foot, and 650 tons of steel sheetpiling was used in the cutoff walls and groins. The wall is backed up with a prism of dry fill, while 60,000 cu.yd. of hydraulic fill is used in the remainder of the depression between the wall and the receded shore line. Figs. 3 and 4 give details of the seawall and groin construction.

The tract of land that the wall is built to protect lies between Lake Worth and the Atlantic Ocean. It varies in width from 700 to 1,400 ft., with a ridge near the ocean side varying from 16 to 26 ft. in height. As late as 1925 the beach line of this property was located some 250 to 300 ft. east of its present location, as shown in Fig. 2. In 1926 the South Lake Worth Inlet Commission constructed a lake inlet at a point 800 ft. north of the north line of the McCormick property. This inlet is about 100 ft. in width, with jetties 400 ft. long on the ocean end and carries a current of about 250 ft. per minute, which on the ebb tide carries out to sea for a considerable distance.

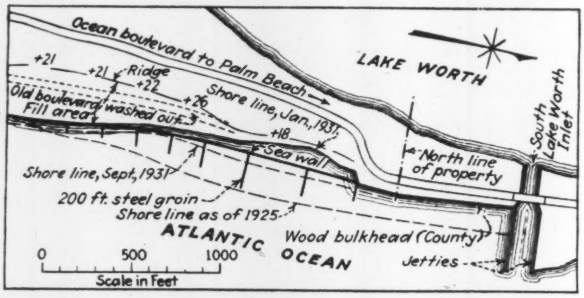


Fig. 2—Seawall reclaimed part of land lost by scour when inlet constructed into Lake Worth intercepted currents that formerly brought sand and deposited it along shore

It is typical of this part of the Florida coast that a very strong littoral current flows from north to south during the greater part of the year. This current carries southward the sand eroded by wave action, but so long as the sand carried away from any section of the beach is replaced by sand brought to it from some land farther north the coastline does not change materially. But with the inlet constructed, the jetties and the inlet current intercepted the sand moving down from the north, and the current carried the sand either out to sea or into the lake. Also the shore current reformed on the south of the inlet, causing erosion without the corresponding accretion. It became evident that all of the land would be lost unless some measures were taken to stop this erosion.

Design Considerations—This land, lying a few miles south of Palm Beach, is very valuable residential property, and when it was decided to build a seawall it seemed advisable to reclaim as much of the lost land as was economically justifiable. The location that was adopted for the wall was on a line running through water varying from 0.0 to 5 ft. in depth; 0.0 is the government datum of mean low water.

Although it was proposed to construct a series of groins, thereby intercepting enough sand to form a beach in front of the wall, the possibility was admitted that this might not take place, and the wall was designed for a possible lowering of the sand level in front of the wall to El. —8.00. This possibility that a beach might not form precluded the use of any wall other than the receding curved-face type. A vertical wall or a wall made up of a series of vertical faces, as in the step type, would have been subjected to constant pounding, the noise and spray resulting from this being very objectionable. The step type in a location where it is constantly exposed to wave action also collects barnacles and other marine growth, as well as seaweed and rubbish.

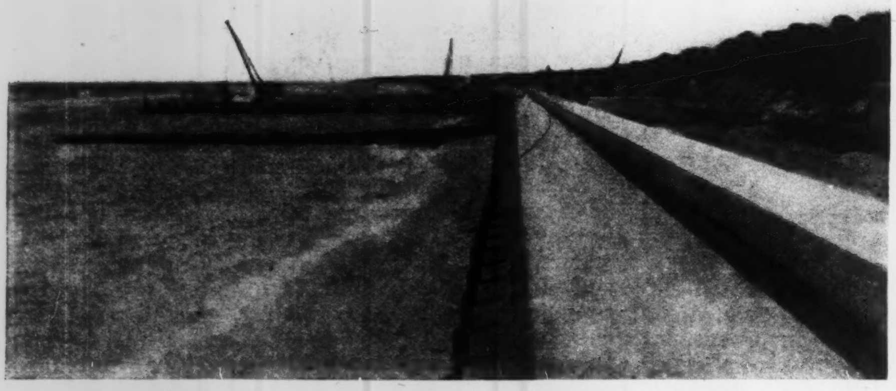


Fig. 1—Beach forming in front of the seawall on Robert R. McCormick estate
Dry fill placed immediately behind wall backed by hydraulic fill. Sheet piles shown were later burned off. Groin construction in background.

One other reason for selecting the type of wall used was that it seemed advisable to design for considerable hydrostatic head that might build up behind the wall during severe storms. To overcome this upward pressure it was more economical to concentrate the material over a narrow base than to spread it over the long slope of the step type. Also, because of the fact that this wall was to be in a location where it would be exposed to the impact of the waves from the very start, concrete of sufficient mass was necessary. A wall of similar outline or curve could have been constructed of thin slabs heavily reinforced, but such a wall would not have had the necessary mass; also the danger of the reinforcing steel rusting was too great.

Selected Design—The wall design selected is a full gravity section, the resistance to sliding being provided by batter piles. The resulting vertical upward reaction of these piles is resisted partly by the weight of the wall and partly by a row of vertical piling under the heel of the wall tested to resist an uplift greater than 10 tons. The connection that transmits the upward thrust is made by two steel straps, shown in Fig. 3. The horizontal thrust of the backfill is also resisted by the sand in front of the curtain wall, but it was assumed that this sand might be washed away to a depth of 8 ft. The toe of the wall rests on a row of wood piles driven to rock.

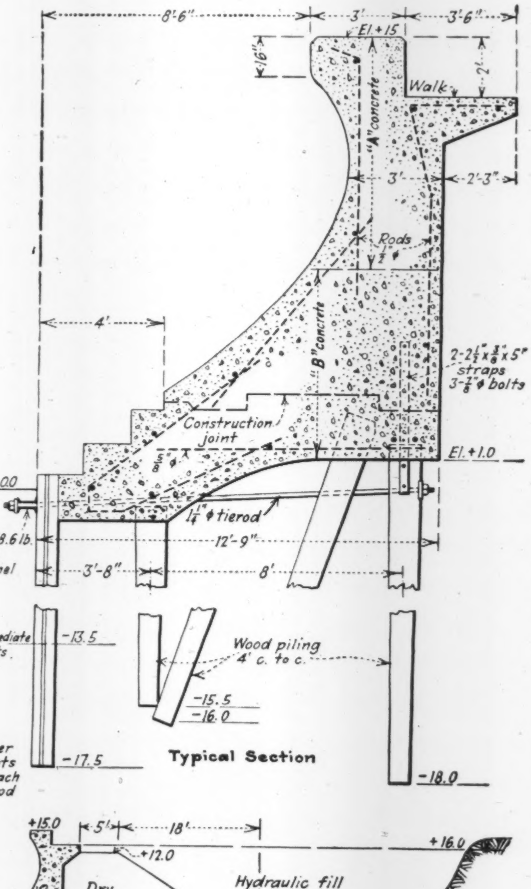

8'-6"
3'
3'-6"
El.+15
16"
2'
Walk
"A" concrete
3'
2'-3"
Rods ½" ϕ
"B" concrete
4'
2-2½"x⅜"x5" straps 3-⅞" ϕ bolts
Construction joint
⅝" ϕ
El.+1.0
M.L.W. 0.0
1¼" ϕ tierod
7"-18.6 lb. ship channel
12'-9"
3'-8"
8'
Intermediate sheets
-13.5
Wood piling 4' c. to c.
-15.5
-16.0
Master sheets at each tierod
-17.5
Typical Section
-18.0
+15.0
5'
18'
+16.0
+12.0
Dry fill
Hydraulic fill
Beach profile
M.W.L. 0.0
Back Filling

Fig. 3—Details of poured-in-place concrete seawall

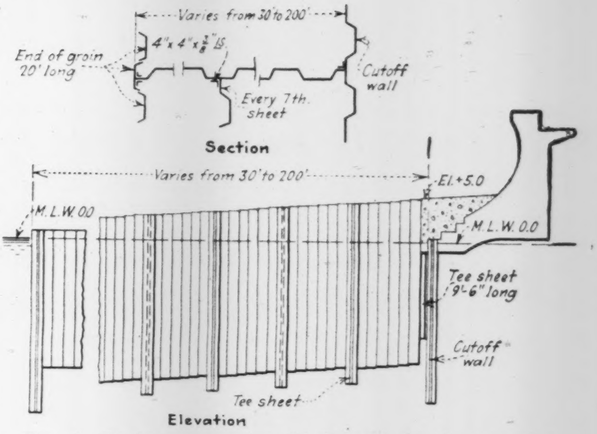

Varies from 30' to 200'
4"x4"x⅜" Ls
End of groin 20' long
Cutoff wall
Every 7th sheet
Section
Varies from 30' to 200'
El.+5.0
M.L.W. 0.0
M.L.W. 0.0
Tee sheet 9'-6" long
Cutoff wall
Tee sheet
Elevation

Fig. 4—Groin construction, McCormick beach protection

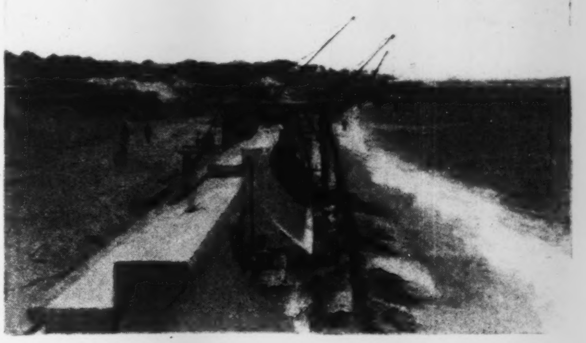


Fig. 5—Pouring concrete seawall in 30-ft. sections

Test piling driven along the line of the proposed wall before the design was made indicated a thin layer of soft rock at El. —8, below this a stratum of sand, and at El. —12 harder rock of sufficient thickness. The steel sheeting forming the cutoff wall penetrates this harder rock and prevents undermining of the wall and the loss of the backfill. Every sixth pile is a master pile, which was driven home at once and anchored by tierods and channel wales. The intermediate piles were allowed to stand with their tops at El. +6, thus providing a cofferdam which made it possible to place the concrete foundation of the wall in the dry, except in rough weather when such work was suspended. After all of the concrete wall had been completed the sheeting was driven to its final grade and the master sheets that had been ordered of extra length were burned off. If this curtain wall sheeting had not been used for protection, it would have been necessary to construct a special cofferdam outside of the wall line, which would have added materially to the expense.

The lower part of the wall was stepped to provide a place to walk on in the event that no beach was formed in front of the wall, to simplify construction of the footing and to provide a surface on which to erect the forms for the upper part of the wall.

As the quality of the hydraulic fill that was to be pumped from Lake Worth promised to be of a fluid nature, it was decided to back up the wall with a dry fill, which would have a higher passive pressure in the event that the wall would have to resist heavy seas before the mud fill had dried out and set. This fill was also to add stability to the wall in the emergency of rough weather before the wall had progressed to a point where hydraulic fill could be started. This dry fill, which was draglined from the adjoining bank, also provided a roadway for cranes and other construction equipment.

A cutoff wall of steel sheeting was provided at the two ends of the wall to prevent scour around the ends and the loss of backfill. These walls are normal to the seawall line and run inshore about 75 ft.

Groins—In planning the groin system the main concern was that the groins near the south end of the wall would cause erosion of the land south of the seawall similar to that caused by the inlet. It was finally decided to start at the north end of the wall with a long groin to stop the shore current and then to decrease the length of each successive groin to the south, ending with a very short groin near the south end. It was assumed that any sand deposit in front of the wall would have to come from the east or southeast and that the groins would prevent the north-to-south littoral current from carrying away these deposits.

Action of the Seawall—It was observed that during nearly all of the summer southeast trade winds prevailed and that the littoral current during that period flowed from south to north. The result of this has been that some 10,000 cu.yd. of sand were deposited and retained in front of the seawall, forming a narrow beach the entire length. For most of the length of the wall the sand is well up on the curved face. It is hoped that the groins will retain this sand when the winds shift back to northeast and the shore current reverses its direction.

Some moderately rough weather has been experienced since the northern half of the wall was completed. The curved face of the wall took the seas without any spray or any noticeable breaking up of the swells. There was no scour at the toe of the wall, and in fact the beach built up more quickly during these periods. At the same time spray was thrown up 30 ft. high and blown inland 150 ft. at places where the 6-ft. protection sheeting had not yet been driven home.

During one of these periods of rough weather the writer inspected some walls of the step type protecting property at Palm Beach and found that spray was coming over these seawalls in great quantities. The same conditions obtained where vertical sheeting walls had been constructed. He also observed that the beach in front of these walls was much lower than it had been during their construction. These facts are recorded only as the writer's observations and are not intended to prove that one type of wall causes scour and that the other type does not.

The ideal seawall, in the writer's opinion, would be one having a smooth surface of the same slope as the natural beach, coming out parallel to the beach and carried to such a height that any wave would recede because of its weight and not because of any obstruction. Such a wall would cause no pounding noises, spray or scour. From a practical standpoint such construction would seldom be possible, but the curved-face wall of a type where the lower part of the curve is a long gentle slope approaches this ideal wall. Also with this type of wall there will usually be enough water at the toe to receive the falling water without injury to the beach.

The seawall was constructed by G. O. Reed, Inc., Miami Beach, Fla. Zurwelle & Whittaker Co., engineers, were associated with George M. Wisner, consulting engineer, Chicago, in the design of the protection work.

Seawall Combines Precast Frame and Poured Parabolic Apron

By CARL WEBER
President, Shore Line Builders, Inc., Jacksonville, Fla.

A REINFORCED-CONCRETE seawall that has recently been completed on the estate of Otto H. Kahn, at Palm Beach, Fla., embodies several novel features in its design and construction. The seawall, having a total height of 23 ft., rests on a steel foundation formed by driving 85-lb. railroad rails 33 ft. long into the rock base underlying the site. The depth of the top of the rock base varies from about 1½ ft. above mean low water to about 10 ft. below. The rock, a combination limestone and coral formation, is fissured and of such a character that the steel piling could be driven to a penetration of about 22 ft. below low-water level. Other details of the seawall design are shown in Fig. 2. The front of the wall represents a parabolic surface starting with a short horizontal section at El.+2 and gradually increasing in curvature to the sharp return or throw-back curve below the coping. An underwater reinforced-concrete cutoff wall placed in a trench cut into the rock is built to a depth of 8 ft. below the lower edge of the curved wall. Steps built integral with the wall are provided at certain

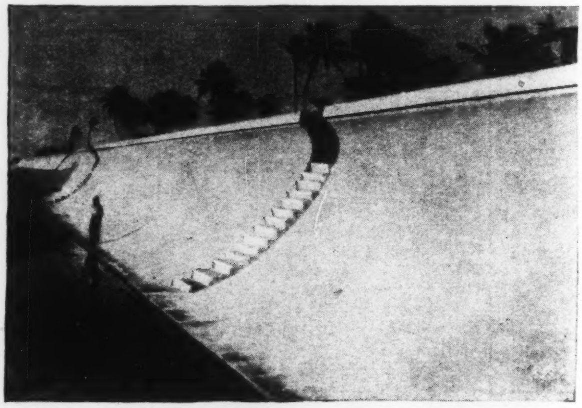


Fig. 1—Parabolic-surface seawall on estate of O. H. Kahn, Palm Beach, Florida

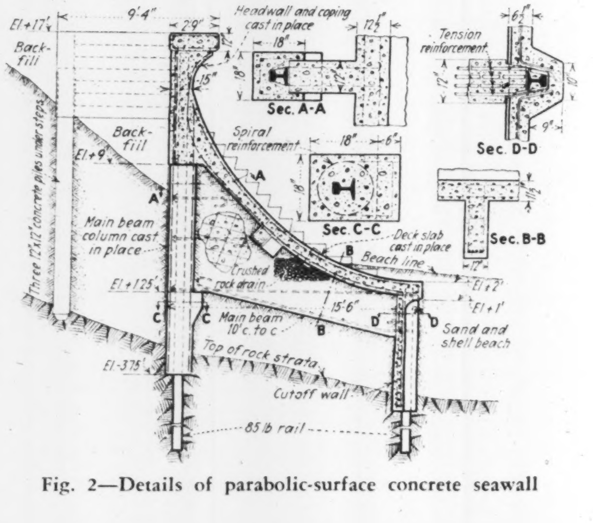


Fig. 2—Details of parabolic-surface concrete seawall

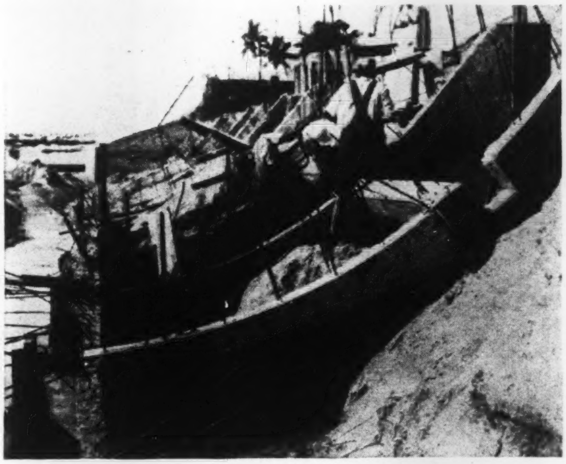


Fig. 3—Placing precast cross-beams and longitudinal girders in parabolic-surface seawall

intervals for convenient access to the bathing beach in front of the wall; they have been so designed as to form the least amount of resistance to the normal wave action.

The seawall as constructed is a combination of premolded and cast-in-place reinforced concrete. The premolded sections, comprising the cutoff wall, the curved triangular cross-beam slabs, which also form the sectional division walls, the cross-beam supports and the longitudinal girders, are united with the poured-in-place parts of the seawall by extension of the reinforcing bars and by concreting the interlocking joints. All the underwater and supporting members of the seawall were premolded and cured for 30 days on high ground near the seawall location in order to prevent contact with seawater before the concrete had properly hardened. Premolding also permitted placing of these parts without the use of cofferdams; a simple jetting method was used at a great saving of cost. The cast-in-place sections of the seawall are the bottom coping, the curved apron, the headwall with throw-back curve and the top coping.

In constructing this seawall the premolded cutoff wall was placed first, followed by the curved cross-beams (placed 10 ft. apart and to a depth 4 ft. below low water) and the longitudinal girders, as shown in Fig. 3. The reinforcing steel was then installed and the curved apron poured in alternate sections 10 ft. wide. Drain pipes were installed in the apron (Fig. 1) to reduce the hydrostatic pressures existing behind the seawall at extremely high tides. At 30-ft. intervals molded asphalt expansion joints $\frac{3}{4}$ in. wide were installed in the apron, while interlocking concrete joints were used in the headwall. The coping and headwall were poured in one operation, and after removal of the forms all exposed surfaces were rubbed with carborundum blocks so that a thoroughly dense and uniform surface would be presented to the waves.

This type of seawall offers numerous advantages. The parabolic face provides for a gradual but rapidly increasing resistance or breaking action to the impacting waves and a nearly horizontal return of the receding waters to the beach, with the result that wave wash and scour, which are disastrous to vertical and stepped-type seawalls, are eliminated. The entire seawall face is smooth and unobstructed so that diagonal waves can spend their force without creating eddies that cause washing of the sand beach in front of the wall.

In addition to its great strength, this seawall also offers the advantages of very economical construction and of the greatest possible permanency. The concrete is waterproofed and made as immune to seawater action as possible. The elimination of cofferdams and of all other temporary structures during construction resulted in a considerable saving in cost. The convenience and rapidinty with which the premolded parts of the structure can be made and placed in position and the economy resulting from the use of the rail foundation piling also tended to lower the cost.

The seawall was designed and built by the Shore Line Builders, Inc., Jacksonville, Fla., under the supervision of Treanor and Fatio, architects, Palm Beach, Fla.

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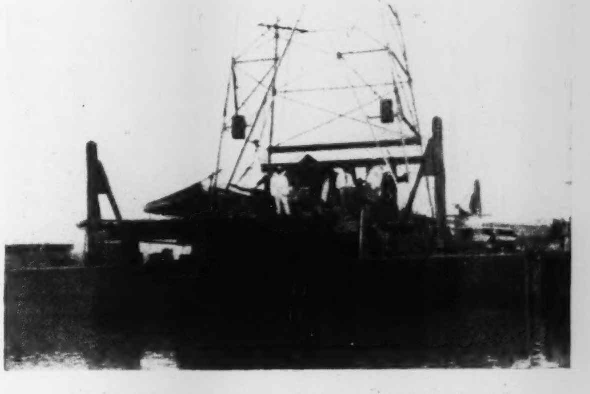
Drill Derrick Mounted on Barge

FACING the necessity of drilling a large number of holes in the bed of Lake Pegneur, a shallow body of water in Southern Louisiana, to determine the extent of an underlying sulfur-bearing rock area, the Jefferson Lake Oil Co. has pioneered a marked departure from accepted methods by operating a 67-ft. tubular derrick from a welded steel barge. The usual method of drilling in shallow water is by derricks erected on piles, involving considerable expense and lost time at each move. With the new arrangement a move that would normally require two weeks has been made in 35 min.

Lake Pegneur contains from 2 to 4 ft. of water, the depth of which can be regulated by movable weirs across the artificial canal outlet. After several holes had been drilled by the old method the company's superintendent, Ed. Laguere, evolved the idea of erecting the derrick permanently as a barge. As it was impossible to bring a boat of sufficient size into the lake, the company's crew erected one on the shore. It is 40x60x5$\frac{1}{2}$ ft. in size and draws 21 in. of water with all equipment mounted. The material used was $\frac{1}{4}$-in. steel plate, amply reinforced and assembled by welding. An interesting detail is a vertical slot extending half way down the middle of the hull so that the barge can be towed away from the casing of a well after drilling is completed. All electrical apparatus is protected from the weather by a light deckhouse. Spuds at each corner steady the unit during drilling operations. Power is purchased from an electric company and delivered over a temporary pole line run out to the barge location.



Welded barge carries tubular steel drill derrick
Note slotted hull and corner spuds.

Cleveland's Projected New Activated-Sludge Plant

Sewage-works for Easterly district will provide grease removal, presettling, aeration and sedimentation, with capacity of 123 million gallons per day—Sludge will be digested at Southerly plant

A NEW activated-sludge plant is now under construction on Cleveland's lake shore at a cost of $12,000,000, to treat the sewage from the Easterly Sewerage District. The site selected is at East 140th St., purchased by the city some years ago for sewage-disposal purposes. The plant will be built to serve 770,000 people, contributing an average dry-weather flow of 123 million gallons daily. Digestion and disposal of the sludge will be carried out at the existing Southerly sewage-treatment works, 13 miles away.

Cleveland already has built two sewage-treatment plants, the Westerly plant at West 58th St. on the lake front, and the Southerly plant in the Cuyahoga River valley in the southern portion of the city. The Easterly Sewerage District, which the new plant is to serve, accounts for nearly half of the city's entire flow and concentrates it at the East 140th St. site. At that point there are now some preparatory treatment devices consisting of coarse screens and grit chambers. The sewage after preparatory treatment and disinfection during the summer is discharged into deep water a half mile off shore and 8 miles east of the existing waterworks intake. The incompleteness of the treatment now given to the sewage from the Easterly District has resulted in contamination of bathing beaches and presents a menace to the city's water supply.

Basis of Design

The Easterly Sewerage District includes the city and suburban area lying between the Cuyahoga River and Euclid Creek, which drains northward from the ridge separating the Lake Erie and Cuyahoga River drainage basins. The ultimate area to be tributary to the proposed plant depends upon the arrangement of future sewers and is not necessarily restricted by the present city boundaries. The basis of design is that the present need pertains principally to areas within the city, while ultimate needs may include portions of Cuyahoga County outside the present city limits. The city area is well developed and stabilized, and any considerable extension of boundaries will probably not be manifest for at least fifteen years. The capacity is predicated upon the present area, 45 square miles.

In 1930 the population of the district was 553,600; after study the future population was set at 650,000 for 1935, 700,000 for 1940, 770,000 for 1945, 844,000 for 1960, and 1,000,000 ultimately. Meter records of the flow of sewage at the Easterly plant site during the last seven years show that the dry-weather sewage flow averages 160 gal. per capita daily. Therefore, the dry-weather flow in 1935, when the proposed plant is to be placed in operation, will be 104 m.g.d., and in 1945, the year for which it is designed will be 123 m.g.d. The ultimate capacity to be provided for is 160 m.g.d.

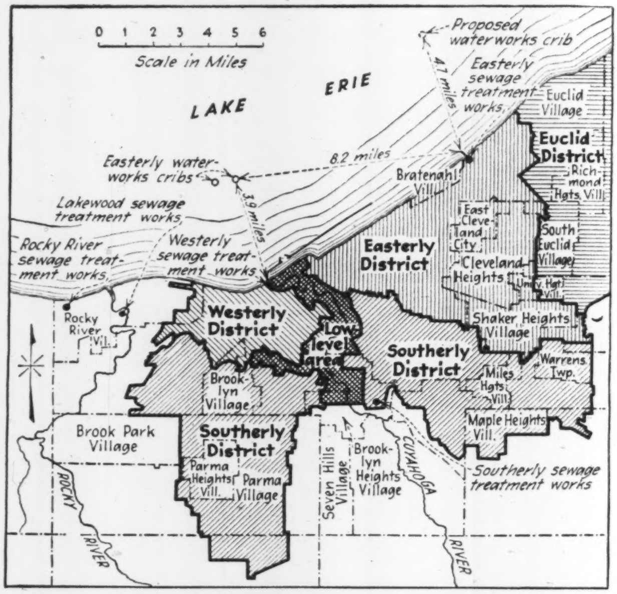

0 1 2 3 4 5 6
Scale in Miles
LAKE
ERIE
Proposed waterworks crib
4.7 miles
Easterly sewage treatment works
Euclid Village
Euclid District
Rich-mond Hgts. Vill.
8.2 miles
Easterly water-works cribs
3.9 miles
Bratenahl Vill.
Lakewood sewage treatment works
East Cleveland City
South Euclid Village
Rocky River sewage treat-ment works
Westerly sewage treat-ment works
Easterly District
Cleveland Heights
Univ. Hgts. Vill.
Rocky River Vill.
Westerly District
Low level area
Shaker Heights Village
Southerly District
Warrens Twp.
Miles Hgts. Vill.
Brook-lyn Village
Maple Heights Vill.
Brook Park Village
Southerly District
Parma Heights Vill.
Parma Village
Seven Hills Village
Brook-lyn Heights Village
CUYAHOGA
Southerly sewage treatment works
ROCKY RIVER
RIVER

Fig. 1—Cleveland's new Easterly sewage-treatment plant will serve the Easterly Sewerage District. The site selected is at East 140th St. and the lake shore

Sewage is collected by combined sewers. Tests indicate that the sewage of the future will have a total-solids content of 770 parts per million, suspended solids, 200 p.p.m.; 150 p.p.m. of five-day biochemical oxygen demand, and 20 p.p.m. of iron. It may be regarded as of moderate strength. While dissolved oxygen is present during the winter months, there are times during the summer when the sewage may be stale for short periods of time. In comparison with the sewages that are treated at the activated-sludge plants at Milwaukee and Indianapolis, that from the Easterly District is weaker and does not contain stockyard or other strong industrial wastes.

Sewage flow will be reasonably constant through the year. During storms, which occur for a total of 6 per cent of the time, the flow will be augmented up to three to four times the dry-weather flow. The problem of stormwater pollution and the requirements for treatment will be met by providing for partial treatment of all flows between 1½ and 2½ times the dry-weather flow. Partial treatment in this case means sedimentation with a 20-min. period of detention. This basis of stormwater treatment means that storm overflows will operate only about 75 hours and that treatment will be given to stormflow about 520 hours in each year. It is estimated that stormwater treatment on this basis will remove from the lake frontage 5,000 tons of solid polluting material each year.

The assumption has been made in the design that the plant should meet the needs of the next fifteen years. However, channels, buildings and space for machinery will be built for ultimate needs. The treatment works to be installed will have a capacity capable of caring for 770,000 people and can be expanded to care for 1,000,000.

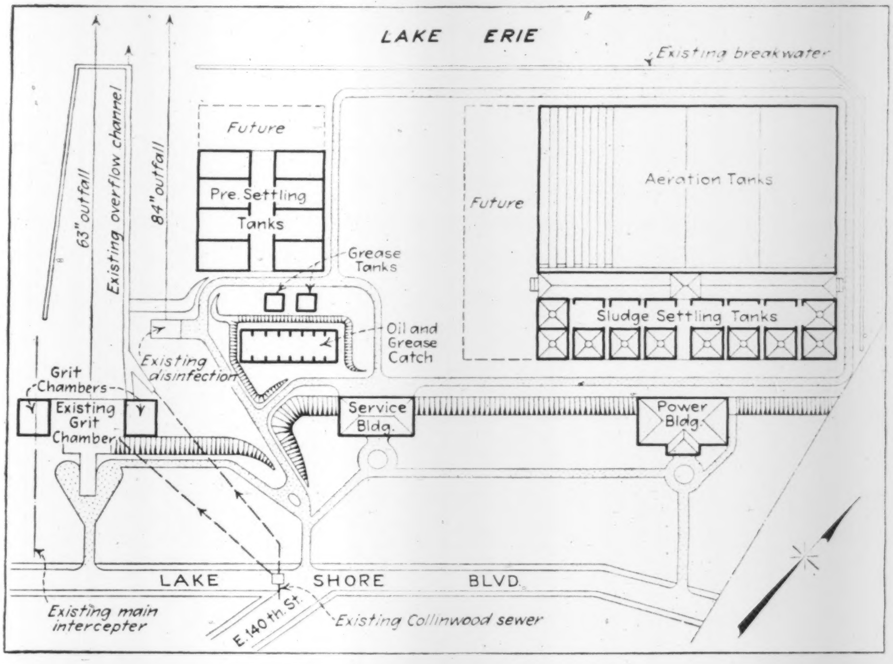


Fig. 2—The space within the existing breakwater will be utilized for the sewage-treatment plant

The site at East 140th St. consists of 45 acres between Lake Shore Boulevard and Lake Erie, with a frontage of 1,700 ft. upon the boulevard. Because of the high-class character of the surrounding development the preparatory-treatment devices are to be provided with buildings.

The activated-sludge proces is to be used because "complete" treatment of the sewage was regarded as offering sufficient advantages to justify the expenditure additional to that required for partial treatment. Trickling filters were considered impracticable because of space limitations.

Preliminary Treatment

The sewage will first pass through bar gratings and grit chambers, where the coarser floating and suspended solids, as well as the sand, will be removed. The gratings will have 1½- and ¾-in. clear openings and will be cleaned mechanically. The screenings will be incinerated. The grit chambers are designed to provide a detention period of 1 min. at a velocity of 1 ft. per second. They will be mechanically cleaned and the grit will be used as fill. Screens and grit chambers will be covered by a building; their capacity is 230 m.g.d.

The effluent from the grit chambers will flow through grease catchers having a detention period of 6 min. In these tanks the grease in the sewage will be floated with the assistance of air agitation, and after its removal will be disposed of by incineration. The grease catcher will have a capacity of 123 m.g.d. Analyses of the sewage show that its grease content can be safely estimated to have an average value of 50 p.p.m., or 400 lb. per m.g. This is not materially different from that of other large cities. On the basis that 60 per cent of the grease can be removed by the special preparatory treatment, the amounts to be anticipated are 13 tons per day in 1935 and 15.4 tons per day in 1945.

The principal reasons for providing preliminary sedimentation tanks prior to aeration of the sewage are to minimize the effect of concentrated industrial waste and of pollution from the first flush of storms, so as to deliver to the aeration tanks an effluent having uniform characteristics; to provide fresh sewage solids, which, when mixed with the activated sludge, will improve digestion; to reduce the total volume of sludge to be handled at the plant; to reduce the air requirements of the aeration tanks; and to provide partial treatment for stormflows. Eight tanks will give a detention period of one hour when the rate of flow is 123 m.g.d. During times of maximum stormflows the detention period will be reduced to 24 min. Sludge will be removed mechanically.

Aeration and Sedimentation

The presettled sewage will flow to spiral-flow aeration tanks providing an aeration period of five hours. Sludge settled out in the subsequent stage of the treatment process will be returned to the influent of the aeration tank in amount equal to 25 per cent of the flow. Each aeration unit consists of two passes, side by side, each 27 ft. wide with a water depth of 15 ft. and a length of 334 ft. Sixteen of these two-pass units will be required. The two passes of each unit will operate in series, so that the influent and effluent conduits can be at the same end.

The number of units is such as to permit of reasonable subdivision of the flow without making the construction too costly. Similarly, the depth and width are at practical limits for economical operation and afford good structural arrangements. The use of two passes simplifies the matter of controlling inlet flows to different tank

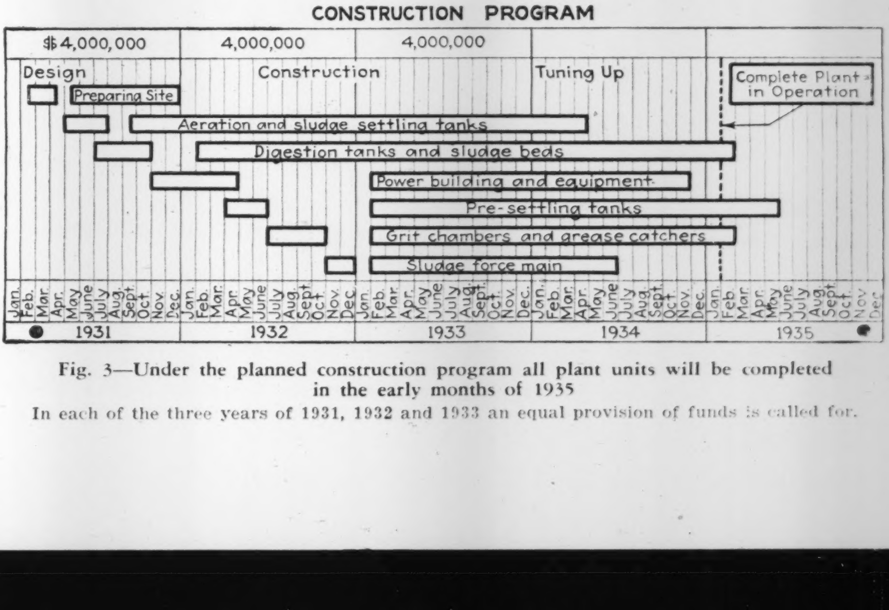


Fig. 3—Under the planned construction program all plant units will be completed in the early months of 1935

In each of the three years of 1931, 1932 and 1933 an equal provision of funds is called for.

units and further admits of building both influent and effluent conduits as part of an operating gallery.

On the other side of the operating gallery will be the sludge-settling tanks, sixteen in number, where the activated sludge will be settled out of the aerated sewage. These tanks are designed for a settlement rate of 975 gal. per square foot per day and will give a detention period of 2½ hours at the average rate of sewage flow to be expected in 1945. The tanks will be circular, 112 ft. in diameter, with sloping bottoms varying in depth from 11½ to 15¾ ft. Mechanical scrapers will be installed to remove the settled material.

Sludge Disposal

The sludge will be pumped through a 13-mile force main to the site of the existing Southerly plant, where it will be digested in inclosed heated tanks. The tanks will be provided with gas-collection devices, and the gas will be burned to supply the heat necessary to maintain the best temperature for digestion. The digested material will be dried on sand beds and then used for filling of low land.

An alternate plan of disposing of the sludge was given considerable study, that of converting it into a fertilizer base. A comparison of the total cost of disposal by the two methods showed little difference between them, but since the net cost of fertilizer-processing methods depended on the uncertainties of a highly competitive market it was not considered advisable. Further, it would involve the city in the difficulties of commercial operations.

Cost of Plant

The total estimated cost of the Easterly sewage works is $12,000,000, divided as follows:

Bar gratings and grit chambers	$410,000
Oil and grease catchers	165,000
Presettling tanks	570,000
Aeration tanks and sludge-settling tanks	*3,100,000
Power equipment	450,000
Buildings	1,670,000
Sludge pumps and force main	630,000
Sludge disposal	
Digestion tanks	1,680,000
Sludge-drying beds	2,230,000
Land and rights-of-way	165,000
Miscellaneous	
Parking and roadways	150,000
Channels, conduits, pipe lines and chlorination equipment	280,000
Breakwater and cofferdam	500,000
Total	$12,000,000

*Low bid, Oct. 23, 1931, was $2,736,874.10

The construction program adopted has for its purpose the nearly simultaneous completion of all the different plant units. This will allow the entire plant to be put into operation in 1935. As the construction of the aeration and sludge-settling tanks will take longer than any of the other units, it was included in the first contract. In 1932 contracts will be let for the digestion tanks and sludge beds, and in 1933 for the power building and equipment, presettling tanks, grit chambers and grease catchers, and sludge force mains. It is planned to have all contracts completed by February, 1935, and the plant is expected to be in full operation by the summer of that year.

The Easterly sewage-treatment plant is being designed in the office of George B. Gascoigne, consulting engineer, of Cleveland. He had associated with him in his preliminary studies Darwin H. Townsend, of Milwaukee, who reported on the fertilizer-process method of sludge disposal, and Charles H. Hurd, of Indianapolis, who reported on activated-sludge settling tanks.

Rock-Asphalt Seal Coat for Mixed-in-Place Surfaces

An 8-in. rock-asphalt surface spread perfectly by blade graders on a bituminous macadam road

By W. W. WEBSTER
Maintenance Engineer, State Department of Highways,
Nashville, Tenn.

EXPERIMENTS begun this year in Tennessee demonstrate the possibility of using a very thin grader-spread rock asphalt as a seal coat for a mixed-in-place bituminous surface. The Spreadstone rock asphalt from Kentucky fields was selected because of its non-skid properties. An experience of eleven years' successful use of this material by the Tennessee highway department was a further recommendation for its selection, although it had never previously been employed in so thin a layer as was required for a seal coat.

An old macadam turnpike was selected. The macadam was scarified, and enough new stone to give the required thickness was added and bladed in under traffic until well bound in. The road was then covered with 80 lb. per square yard of ¼- to 1¼-in. limestone. This aggregate was treated with 0.6 gal. a square yard of 80-105 penetration cutback asphalt, bladed and rolled in place, after which 8 lb. per square yard of screenings was spread and given an application of the same oil at the rate of 0.2 gal. a square yard, and the whole surfacing again rolled. This left a surface with voids.

Seal coat of rock asphalt ⅛ in. thick on mixed-in-place surface

As the state had no experience with applications of rock asphalt less than 100 lb. a square yard, it was decided to try out several thicknesses, and sections were laid with 50, 40, 30 and 10 lb. a square yard. It was found that the 10-lb. application filled all the voids in this particular surface and provided a perfect seal with the tips of the stone aggregate showing. With the 30-, 40- and 50-lb. applications there were provided both a perfect seal and wearing courses respectively ⅛, ¼ and ⅜ in. thick.

All of these applications were successfully spread with blade graders. Always previously rock asphalt has been spread by hand or with a finishing machine. The grader functioned perfectly, and the results obtained could scarcely be improved.

The highway department will continue to watch this experiment and will keep accurate records of service. While it is not felt that such thin surfaces are warranted on concrete bases, it is believed that they will prove successful on flexible bases.

Tunnel Grouting at Cobble Mountain

Procedure, results and cost of well-planned grouting systems on two tunnels on Springfield, Mass., water supply and hydro-electric project

By HARRY H. HATCH

Engineer in Charge, Cobble Mountain Reservoir, Springfield Waterworks

ENGINEERING LITERATURE contains comparatively little on the important subject of tunnel grouting. The following article describes the methods used and results obtained in grouting the Cobble Mountain diversion and pressure tunnels. Previous articles on the construction of these tunnels have appeared in *ENR* in the issues of Sept. 24, 1931, p. 507, and Dec. 24, 1931, p. 988. The entire project was briefly summarized in the article published Sept. 24, 1931, and was described more fully in the issue of July 26, 1928, p. 124. —EDITOR.

GROUTING is always necessary behind a concrete lining in a rock tunnel, especially if the concrete is placed by the pneumatic process. In setting, the concrete shrinks away from the rock surface, especially at the crown, leaving voids. Usually the depth of opening is greatest at the crown, narrowing toward the haunch and disappearing below the springline. Furthermore, there are always pockets in the rock that are never completely filled with concrete.

There are two rock tunnels on the Cobble Mountain project, both horseshoe sections. The diversion tunnel, 1,600 ft. long, is 11 ft. 6 in. high inside of lining. The pressure tunnel is 7,100 ft. long and 9 ft. 4 in. high inside of lining. Special attention was paid to grouting both of these tunnels. Before starting the lining on each tunnel, a careful survey was made of the water seams, mud pockets and any other unusual condition of the rock surface. During the lining operations drain pipes were placed through the forms to take care of running water; these were later grouted.

Fig. 1—Grouting Cobble Mountain pressure tunnel

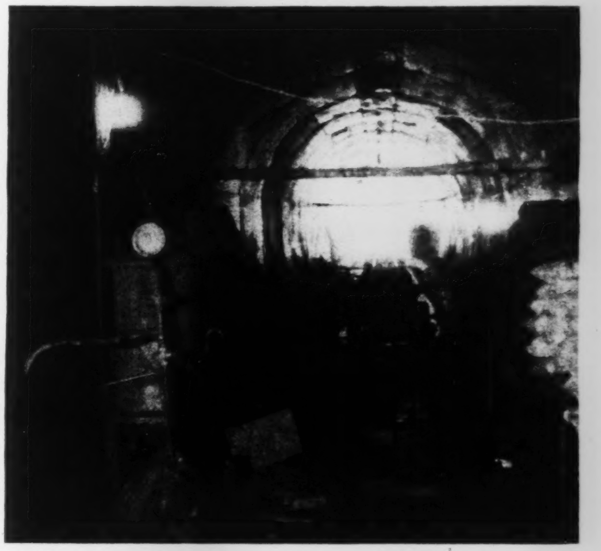


Fig. 2—Type of grouting machine used for diversion tunnel

Diversion Tunnel—In the diversion tunnel an elaborate grouting schedule was divided into three types, as follows: type 1, to fill up the voids at the crown of the arch; type 2, to fill voids back of the concrete at the haunches; type 3, to seal up cracks and seams in the rock itself.

Particular attention was paid to grouting between Sta. 2+00 and Sta. 7+00. (Note: Inlet portal, Sta. 0+08; center of shaft, Sta. 3+50; outlet portal, Sta. 15+50.) In the section between Sta. 2+00 and Sta. 4+00 are located the control works of the tunnel. When the reservoir is full, this section will be subject to the external pressure of a head of 200 ft. It was desirable to seal up all seams in the rock up to Sta. 7+00, well past the center line of the dam, in order to prevent any possible leakage between the reservoir and tunnel.

The operations for type 1 consisted of grouting the roof of the tunnel through a single line of holes spaced at various intervals. These holes were spaced 20 ft. c. to c. from Sta. 0+20 to Sta. 1+80, and from Sta. 7+05 to Sta. 15+25, and were 10 ft. c. to c. from Sta. 2+00 to Sta. 6+85. Type 1 grouting started from the outlet portal, and every fourth hole (80 ft. c. to c.) was grouted first. Then the holes midway between the first set were grouted, followed by the holes between the first and second sets. Between Sta. 4+05 and Sta. 6+85 additional intermediate holes were put in, bringing the centers 10 ft. apart. Each series was allowed to set before work on the next series was commenced.

During the pouring of the first few sections of lining an attempt was made to hold the grout pipes in place through the forms. Although the pipes were placed as tight as possible, it was found impossible to hold them in place against the force of the discharging concrete. Consequently, it was necessary to dispense with the grout

SUMMARY OF GROUTING DATA, PRESSURE TUNNEL

Grout holes in crown of arch	336
Pipes set in lining to drain running water	15
Special grout holes	103
Total grout holes, 7,100 ft. of tunnel	454
Yield of grout per barrel cement, cu.yd. (1 bag cement with 6½ gal. water)	0.2
Total grout used (1,550 bbl. cement), cu.yd.	315.7
Average grout per linear foot tunnel, cu.yd.	1.3
Average cement per grout hole, bags	13.7
Maximum cement any one hole, bags	237.0
Total grout to total concrete, per cent	3.6
Average cost grout per hole	$24.60
Grouting cost per foot tunnel	$1.75
Grouting cost per cubic yard grout	$35.40

pipes in the forms and to drill all grout holes after lining was completed.

Type 2 grouting consisted of a hole on each haunch of the arch, located radially 30 deg. above the springline. This type was used at 10-ft. intervals between Sta. 2+05 and Sta. 4+05. Later type 1 grouting was used within this section.

Type 3 grouting consisted of eight holes drilled 10 ft. through the lining and into the rock. Starting at the crown, these holes were drilled at 45-deg. intervals around the section. This type grouting was used between Sta. 1+95 and Sta. 4+00. Rings were first drilled and grouted at 20-ft. intervals, then at 10-ft. intervals. Additional intermediate rings were drilled wherever necessary.

Grout holes were 2 in. in diameter. Pipes of 1½-in. diameter and 1 ft. long were used. About 6 in. of the pipe was put into the hole and calked tightly with oakum. To the end projecting out of the lining was attached a coupling and valve connecting with the grout hose.

The grout machine consisted of a small cylindrical tank with a flap gate at the top for admitting the charge. Grout was mixed by agitating with air for 1 or 2 min., the air being admitted at the bottom. In operation, the main air supply was admitted at the top, forcing the grout through the hose connected at the bottom.

A maximum air pressure of 100 lb. per sq.in. was used in placing the grout. Every hole was started with a neat grout except those known to lead into large pockets. When a hole took a considerable quantity of grout, sand was added to the mix, but never in a greater proportion than 2 parts of sand to 1 of cement. The general average of the mix for grouting the entire tunnel was 1 : 1.

During the grouting of the first holes the adjacent holes acted as vent pipes. In grouting the final holes, as there were no means for the air to escape, the pipes were held in place with wooden wedges instead of oakum to provide a vent.

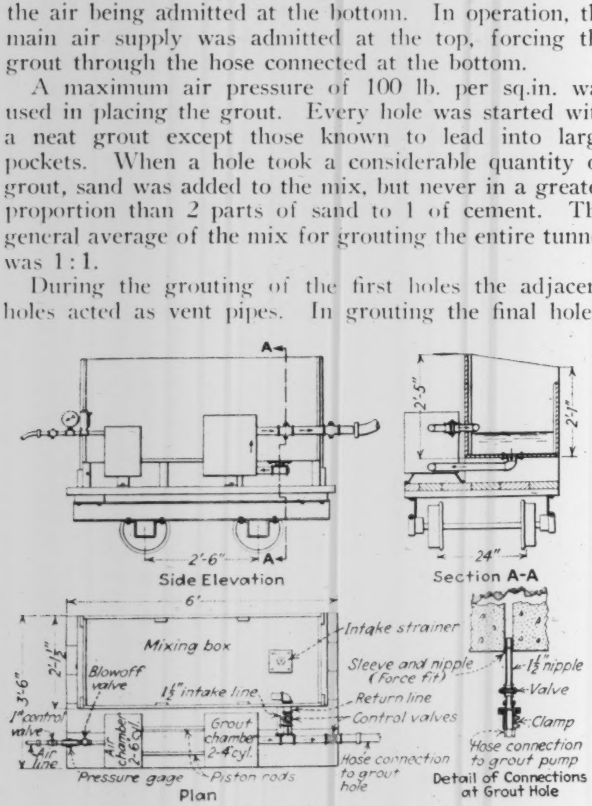


Fig. 3—Home-made grouting machine used in pressure tunnel

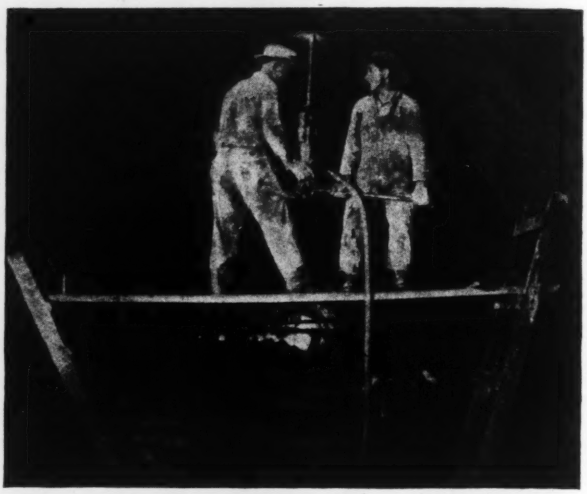


Fig. 4—Drilling grout holes in crown of diversion tunnel

Types 1 and 2 grouting cost $5.52 per linear foot of tunnel. Type 3 grouting cost $4.12 per linear foot. The general average of all types of grout used was 4 cu.ft., and the cost $6.64 per linear foot of tunnel. All grouting in this tunnel was done on a cost-plus basis, the costs given being the totals.

Pressure Tunnel—In the 7,100-ft. pressure tunnel, grout holes were drilled in the crown of the arch at 20-ft. intervals. First, every fourth hole was grouted. After allowing 48 hours for the grout to set, the holes halfway between were grouted. After these had set 24 hours, the remaining holes were grouted.

The first set of holes was grouted starting with 10-lb. pressure and increasing it up to 50 lb., or until grout started flowing freely from neighboring holes. The same procedure was followed with the second set of holes, except that the pressure was increased up to 100 lb., or until grout appeared in near-by holes. The final holes were grouted with 100-lb. pressure, with a maximum of 150 lb., if necessary, to shut off a flow of water.

Observation showed that the amount of grout taken by a hole in a tunnel driven through mica schist is no criterion of the void between the concrete and rock in any given length of tunnel It was, at first, assumed that if the tunnel were thoroughly grouted every 20 ft., all voids would be filled, judging from the amount of grout taken by the final holes if additional intermediate holes were necessary. In actual practice it was found that in some cases where the final regular grout holes took considerable grout, additional intermediate holes took as much. Again, where the regular final holes took no grout, intermediate holes, drilled to make sure the tunnel was tight, took a considerable quantity.

From these observations it was concluded that the grout was stopped from traveling from one hole to another 20 ft. away by uneven breaks or juts in the rock walls. In some cases grout traveled much more than 20 ft., evidenced by the grout seeping through the concrete at a weak point in the lining some distance away. Water from the high-pressure grouting came through the lining at various points. Additional grout holes were placed in these wet spots, a total of 103 such holes being drilled throughout the tunnel. About half of these took additional grout, some as much as 77 bags.

It was essential to know that all of the voids behind the lining were filled with grout. A check on the amount of grout required by a section of tunnel was made by computing the volume of concrete required and comparing with the amount actually placed. The volume of concrete required was carefully computed with the aid of pantograph cross-sections taken at regular intervals where unusual breaks occurred. Careful records of the amount of material going into the mixer showed the actual concrete yardage placed. Computed amounts of grout required and those actually placed checked remarkably well.

The grout pipes were 1½ in. in diameter and 4 in. long, with a 2-in. sleeve at the bottom. A strip of cement bag dipped in grout was wound around the pipe, which was then forced into the hole in the concrete lining. To the sleeve at the bottom of the pipe was attached a valve connected to the hose leading to the grouting machine. Through the arrangement of a bypass, grout in the hose could be blown back into the chamber after a hole was filled.

Two home-made grouting machines were used, each consisting of a duplex-piston air pump with a mixing chamber, both mounted on a flat car (Figs. 1 and 3). The grout batches consisted of two bags of cement and 13 gal. of water, mixed by hand within the chamber for 3 min. Two grouting gangs worked two 11½-hour shifts per day, each crew consisting of one machine operator and two laborers. The accompanying table summarizes the grouting data.

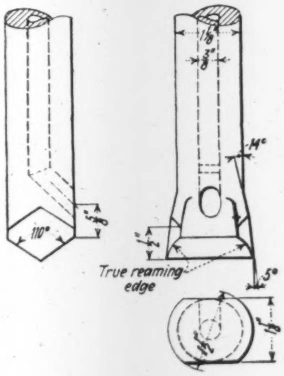
The contractor had the option, in holes taking more than one bag of cement, to use a 1 : 2 mix of cement and sand. However, a neat cement grout was used throughout, the mix consisting of equal volumes of water and cement. At first thought the use of neat grout may appear more expensive than that of a sand and cement mix, but such is not the case. The neat grout travels farther than the sand mix and fills the voids more easily. In a sand mix the sand, being heavier than the cement, is apt to hinder the free flow of grout, causing sand pockets or preventing the complete filling of a section, requiring additional holes to be drilled. The cost of possible extra holes, coupled with extra wear and tear on machinery caused by the sand mix, makes the neat grout less expensive, even though a few extra barrels of cement are required.

Drill Truck Bottoms Nineteen Hundred Holes a Day

Rock bottom of West Neebish Channel in St. Marys River being deepened 6 ft. by cut 9,400 ft. long and 300 ft. wide, using gang-drill trucks with ten drills

By FREDERIC J. MEYSTRE, Jr.
Worthington Pump & Machinery Corp., New York, N. Y.

IN DEEPENING the West Neebish Channel of St. Marys River, the famous connection between Lake Superior and Lake Huron, the contractor was faced with the problem of removing 620,000 cu.yd. of Niagara limestone of dolomitic nature, which weighs 4,600 lb. a yard. The present channel 9,399 ft. long and 300 ft. wide, is to be deepened almost 6 ft. so that, with a minimum depth of 27 ft. vessels drawing 24 ft. may safely navigate the channel. As left by the 1908 excavation, the channel presents an almost perfectly smooth bottom, flanked on either side by retaining walls. The top 5 ft. of the retaining walls, above the water line, have a batter of 3 on 1. Incidental work on the project includes the repairing of 1,000 sq.ft. of the surface of the walls.



Special drill bit designed to prevent plugging and for quick retraction

Cofferdams were built at the ends of the 2-mile stretch of channel and the inclosure was unwatered. Working on the nearly dry bottom, the contractor proceeded to drill and blast, using for drilling gang drill-trucks with which it has been possible to drill more than 1,900 holes 6 ft. deep per 24 hours per truck.

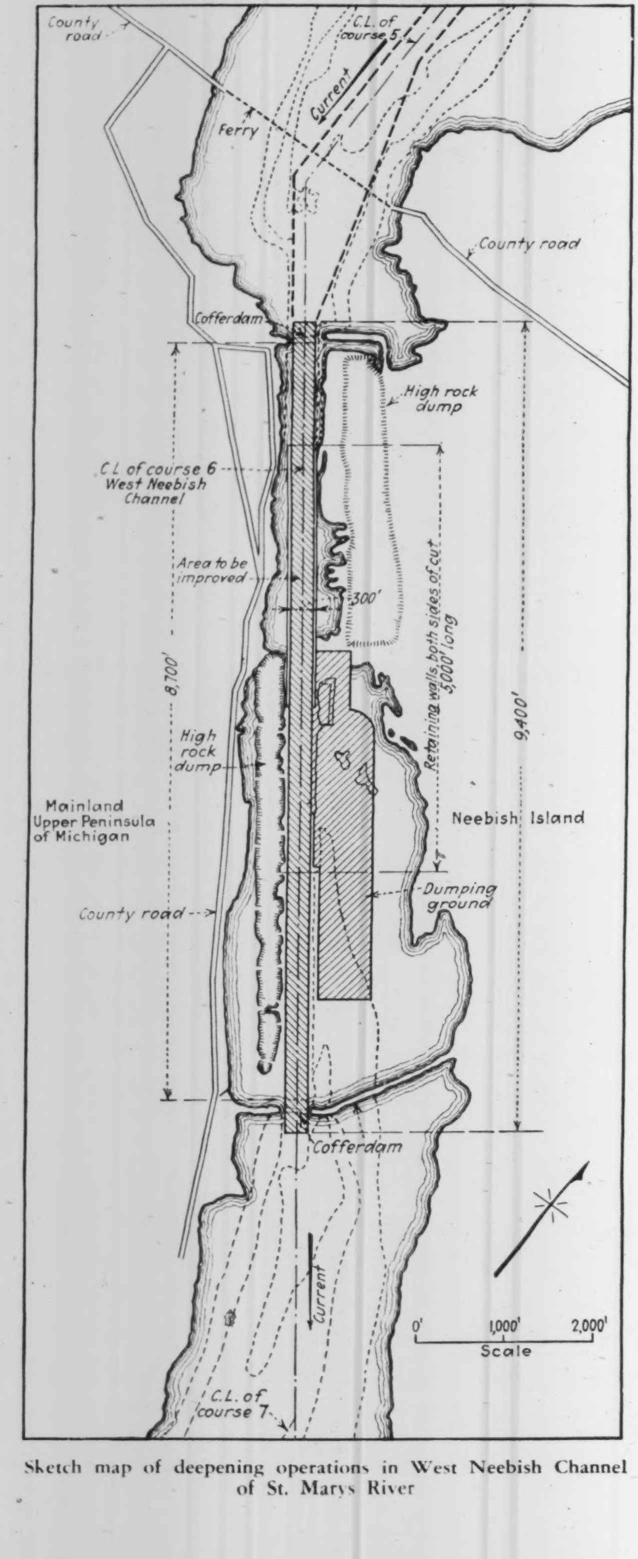
It was necessary to build the cofferdams extra strong because of the ice floes which, during the four months that the river is icebound, tend to break through any but the strongest dams. To avoid this danger, which twice caused the work to be interrupted during the 1908 project, the contractor constructed rock- and earth-fill crib dams. These dams are from 56 to 60 ft. wide on top and considerably wider at the bottom.

Gang-Drill Truck Developed

Realizing that the greater part of the time devoted to drilling many thousand holes is consumed not in actual drilling but in setting up the drill and removing the steel, the company's engineers, under the direction of Charles A. Hirschberg, working with the contractor's organization, set out to devise a system which would avoid this waste motion.

Instead of attempting to speed up individual drilling operations, a drill truck was built which was in effect a drill boat on wheels. Ten rock drills are mounted on each of two trucks. The drills, 9 ft. apart laterally and 4½ ft. apart in the line of travel, are placed five on each side of the truck. The second of the two trucks follows with one line of drills on the center line of the first truck. The trucks proceed from dam to dam—that is, lengthwise along the canal. They were constructed as follows:

First, 5-ton trucks were stripped to the chassis and then lengthened sufficiently to accommodate the five drills on each side. Wood cross-stringers were placed on the lengthened and reinforced chassis frame. The stringers, of 6x6-in. oak, were located at the pedestal supports for the mounting. A 3-in. oak sub-floor was laid on these stringers, this sub-floor being reinforced at the outer edges, where the drill mounting is attached, by a $\frac{3}{16}$-in. boiler plate which extends the full length of the truck. This boiler plate is placed both on the sub-floor and underneath the stringers. The drill mounting was placed on the sub-floor and securely fastened to it by bolts which extend through the foot-flanges of the mounting, the sub-floor, the stringers and the boiler plate.



Sketch map of deepening operations in West Neebish Channel of St. Marys River

The mounting itself, with pedestals and crossbars, was welded together as a single unit by means of 4-in. double-extra-strong pipe. This arrangement gives a longitudinal bar extending the full length on each side of the truck platform. On this drill-mounting were clamped $4\frac{1}{2}$-in. saddle clamps similar to those employed on the usual mine or shaft bar. The machines themselves were mounted by setting the cone trunnions of the machines into the saddle clamps. A 2-in. oak floor for the men to stand on was laid on the crossbars of the drill mounting. Pipe extensions were run up from each pedestal to support a shelter roof. Additional protection against inclement weather is provided by hinged side-doors which can be lowered. The whole truck is floodlighted and operates 24 hours a day.

An air manifold, 10 in. in diameter, is fastened on the sub-floor. This manifold runs the full length of the truck and is provided with outlets for each drill, the connections being made by short lengths of hose from the manifold to the drills. The manifold, of 10-in. steel pipe, is capped at both ends and drilled and tapped at proper intervals for 1-in. outlets. At each outlet is placed a 1-in. hose-valve and beyond each hose-valve there is a line lubricator to which is coupled the hose at each outlet opening of the manifold supplying the drills. A trap-door is provided in the top floor so that the drill operator can have access to the hose-valve and to the lubricator. At the rear end of the manifold is a 4-in. Y, having two $2\frac{1}{2}$-in. branches which are coupled to the manifold cap, fitted with $2\frac{1}{2}$-in. hose coupling threads.

The air supply is brought to the truck by two $2\frac{1}{2}$-in. air hose from the main line. These hose, 150 ft. long, give the truck an operating area 300 ft. square before new connections have to be made. Should one or two holes lag behind the rest, the truck can be moved to a new position, and a hand-held drill, coupled to an extra manifold connection, will clean up the hole.

Drills and Drill Servicing

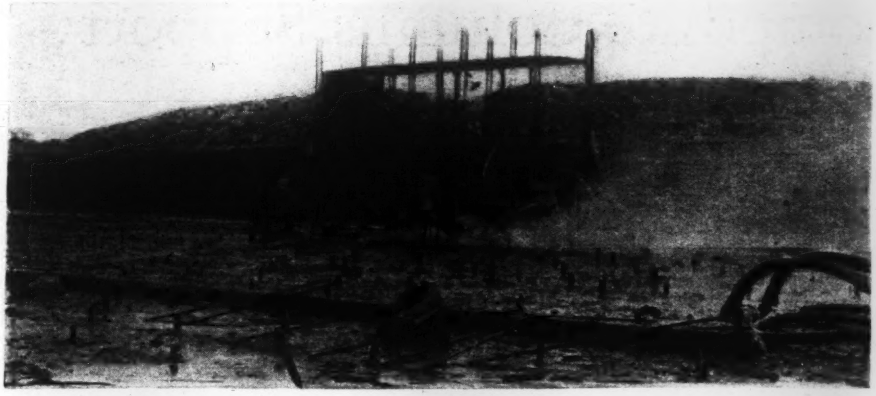
The drills are self-feeding, having a 3-in. cylinder diameter and a 3-in. stroke. They are equipped with a pneumatic air feed for feeding the drill to the work and for retracting it.

The drill engine is mounted on a slide which travels in ways which are an integral part of the air cylinder. The piston rod is coupled to the rear end of the drilling engine, and the feed mechanism obtains its supply of air from the same hose that supplies the drilling engine itself, although a separate throttle valve is provided for controlling the feed.

To enable the machine to spot and collar the drill hole without the necessity of man-guidance, an extension arm fastened to the forward end of the feed cylinder carries a hinged-cap bearing that acts as a guide for the drill steel.

When the drill truck is in operation, two men stationed on the drill wagon operate the throttles of all ten machines. Two men are stationed on each side of the truck on the ground. These four men change the drill steels every fifteenth move of the truck. The driver of the truck enters all performance data for the numerous records which are being kept and supervises the lubrication of the unit. Fifteen holes per steel have been adopted as standard performance, although as many as 27 holes per steel have been obtained.

Experiments were made with various shapes of drill



Gang drill truck sinking ten holes every seven minutes; stakes show drilled holes

bits. The object originally was to drill a minimum of ten 6-ft. holes before the steel had to be resharpened, and to design a bit that would bottom the full 6 ft. and retract easily. This latter requirement was particularly important because the Niagara limestone lay in practically flat beds, decidedly stratified and with varying thicknesses of mud seams. To avoid the trouble that these mud seams are apt to cause, due to the drill bit becoming plugged, a bit was designed which, although of the bull-bit family, differed from it in several important respects. It has a reaming gage, but it has the blowing hole in the flat side instead of through the end of the bit. In the process of punching, the end-hole was stopped. The gage diameter of the body of the steel has been reduced to the point where it offers the least resistance to extraction. The efficiency of this bit was proved by the fact that it drilled as many as 27 holes before resharpening was necessary.

The number of operations are reduced to seven by use of the truck. Incidentally, a drilling cycle (steps 4 to 7 inclusive) is completed every seven minutes. In consecutive order, the steps are: (1) hook main air hose to manifold, (2) insert drill steels in chucks, (3) spot truck, (4) open feed throttles, (5) open drill throttles, (6) upon completion of drilling reverse throttles, and (7) move truck.

It was necessary for the Connolly Contracting Co. to establish its own construction city, and in addition to renovating the old steamer "Indiana" the contractor had to build a complete blacksmith shop. This shop is arranged so that all work is routed through in a straight line. There are two furnaces, the oil supply being fed by gravity from a tank elevated 14 ft. One furnace is for heating the steel under automatic pyrometer control for the forging operation, and the second is for heating for tempering. The automatic controls are individually set for the required furnace temperatures.

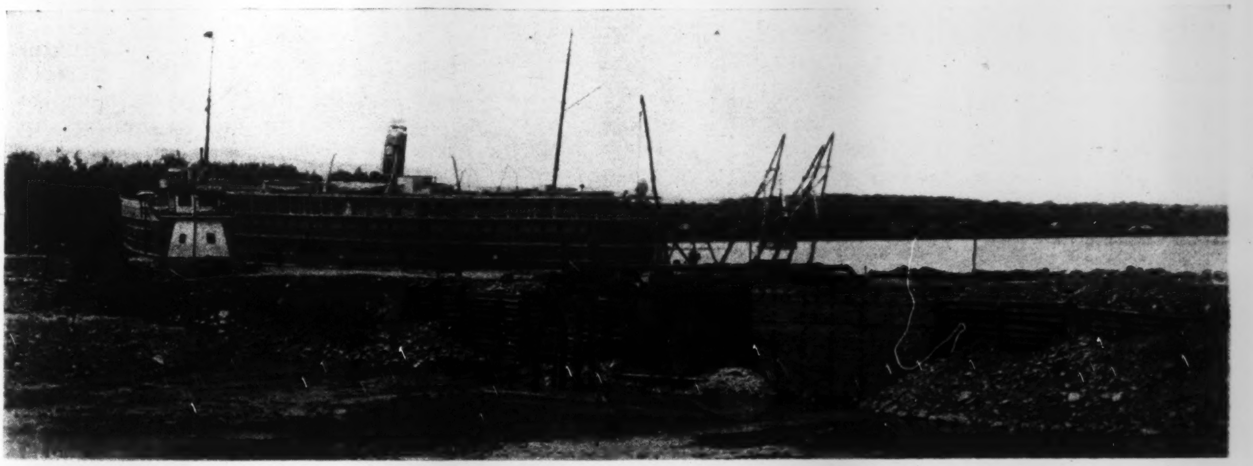
The sharpener handles 400 pieces every 24 hours. It should be noted that only one size bit has to be sharpened.

A quenching tank was designed with a water-bubble in which the cutting edge of the bit could be hardened, thus preventing the formation of steam bubbles which ordinarily cause soft spots. The bit is held manually in the water bubble for the proper length of time and then gradually submerged in the tank, after which it is ready to be placed on the racks. In one end of the water quenching tank is submerged an oil tank containing quenching oil used to harden the drill shanks. The water keeps the oil cool and in the proper condition.

The drilling trucks at West Neebish have kept so far ahead of the blasting that it has been unnecessary to shut them down during the blasting. Blasting is done at the end of each shift of eight hours. All of the holes are loaded with 40 per cent dynamite, and are set off by a single detonation. So accurate has been hole spacing that practically no secondary drilling has been necessary.

Hungarian State Railways to Absorb Private Systems

In an effort to put the state railroad system of Hungary on a paying basis, all of the privately owned railways, already leased and operated by the state system, are to be consolidated with the state railways, making it possible to abolish the separate tariffs that have heretofore prevailed and thus greatly simplify the railway rate structure. The private lines to be absorbed have a total length of 4,052 km.



Anchored steamer provides living quarters and power plant for channel-deepening operations

Unusual Composite Columns Support St. Louis Newspaper Plant

Concrete reinforcing placed inside battened steel angle columns in new Globe-Democrat Building—Slabs carrying presses insulated from structure by cork

By CHARLES W. MARTIN
Martin Engineering Co., St. Louis, Mo.

WITH PLANS adapted from the experiences of some of the most successful newspapers in the nation and with many innovations especially applied to its own problems, the St. Louis *Globe-Democrat* recently completed a notable new building to house its publishing activities. Especially interesting was the structural work in this building, located at High St. and Franklin Ave., in St. Louis, Mo.

Unlike most buildings, a newspaper plant calls for a building of special requirements. Thus, this building was planned to have ample facilities for storage of the huge paper rolls. It was designed to withstand the stress, strain and vibration of the presses and to carry the heavy loads of typesetting machinery. In general, the building is of reinforced concrete, although structural steel was put to use in some rather unusual ways.

The typical spacing of column center lines is 20 ft. 4 in. along High St., and 21 ft. 6 in. normal thereto; but in the pressroom area the second and fourth line of columns paralleling High St. are omitted, and the room is constructed as an open story from the reelroom floor up to the mailroom floor—a height of 38 ft. At that elevation a system of heavy two-span girders, 43 ft. long, is employed to allow the resumption of the typical column spacing for the three upper floors and the roof.

The press room is nine (20 ft. 4 in.) bays, or 183 ft. long and considerable variation in the detail of girders and columns was necessary on account of the wide differences of loading for the composition room floor, which is next above the mail-room floor. However, since seven of the bays carry similar loads and, in the final analysis, determined the general design of the building, this article will be limited to a brief discussion of their framing, although this framing meets only the lighter requirements. In fact, certain of the grirders and columns are as much as 25 per cent greater in load-bearing resistance than are the typical members.

In the typical design the interior columns from above impose a design load of approximately 314,000 lb. at the points of mid-span and the points of support for the girders, which carry also the mailroom floor construction, the ceiling slabs over the pressroom and some items of mechanical equipment. These girders are 48 in. wide, and and their general structural depth is 73 in. but in the region of the central supports their bottoms are flared down 15 in. in order to secure a total structural depth of 86 in. at the point of maximum negative bending moment. These girders were designed as freely supported, two-span continuous units. They are braced laterally by diaphrams in alternate bays; and while they are large (others not typical are of widths up to 60 in.), there is nothing unique in their design.

The setting of such a heavy system of concrete girders on steel bearing plates at the top of long slender columns was, however, a condition making necessary considerable exactness of detail for the structural framing as a whole and also involving great care in construction.

The clearance requirements for paper storage in the sub-basement limited all interior columns throughout the building to a width of 26 in. in a north and south direction (parallel to High St.). In and around the pressroom area the columns above the reelroom floor were restricted by the printing plant layout to east and west dimensions of 25 in. at the High St. wall line, 26 in. at the line of central columns, and to a projection inward of not more than 13 in. west from the center line of the columns at the east side of the pressroom. These restrictions limited the columns supporting the girders to sectional sizes for which reinforced-concrete columns of accepted design would not suffice, so it was necessary to resort to composite columns.

The type of composite columns used is

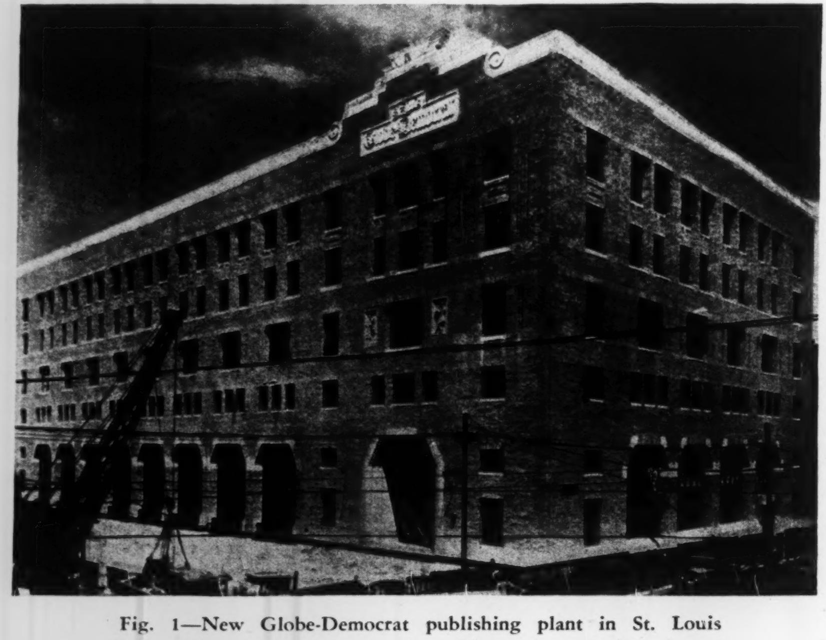


Fig. 1—New Globe-Democrat publishing plant in St. Louis utilizes heavy concrete construction with novel composite columns

somewhat unusual in that the structural-steel element consists of a four-angle column with horizontal battens and end plates, and the structural-concrete element consists of a reinforced-concrete column within the box section of the structural steel. This type of column offered many advantages over the ordinary types of composite columns for the particular purposes of this structure. It offered a relatively high radius of gyration for the evaluated section as a whole, which was an important consideration on account of the considerable unbraced length of the columns in the High St. wall line, and in the center of the pressroom. It offered a section into which it was fairly easy to anchor horizontal framing members of either concrete or steel; and it also offered other advantages in the fabrication and binding-in of certain supplementary side struts and auxiliary columns, particularly in the sub-basement.

These composite columns extend from base plates below the sub-basement floor up through the reelroom floor to top plates at the bottoms of the mailroom floor girders—a height from plate to plate averaging 52 ft.

Bars and spirals for the concrete elements of the composite columns were set and wired in place within the box sections before the steel elements were erected. When erected, the steel elements were held in place by temporary steel bracing until after the mailroom floor construction was completed.

The top plates of the composite columns are rolled steel slabs, typically 44 in. square and weighing approximately 2,700 lb. To obviate handling them over the formwork, they were erected with the steel element of the columns. And to facilitate the operations of concreting, the connection angles for these plates were extended out so that the plates might be temporarily held clear of the column box sections and then be easily moved to central alignment at the proper time. Lateral anchorage for the structure was provided by dowels, which extended through the plates and into the girders and the column cores. The concrete for the composite columns was brought up in stages to a point below the bottom extremity of these dowels; the plates were then moved over, and the protruding ends of the connection angles were burned off. When the concrete below had taken its shrinkage (ten days minimum set) the dowels were put in place and the concrete was carried up to within 2 in. of the plates, allowed to set and grouted in.

The typical section for the central row of columns under the girders is 26 in. square, with four $8x8x1\frac{1}{8}$-in. angles set $21\frac{1}{2}$ in. back to back. The reinforcement for the concrete element consists of a $\frac{5}{16}$-in. spiral of $18\frac{3}{4}$-in.

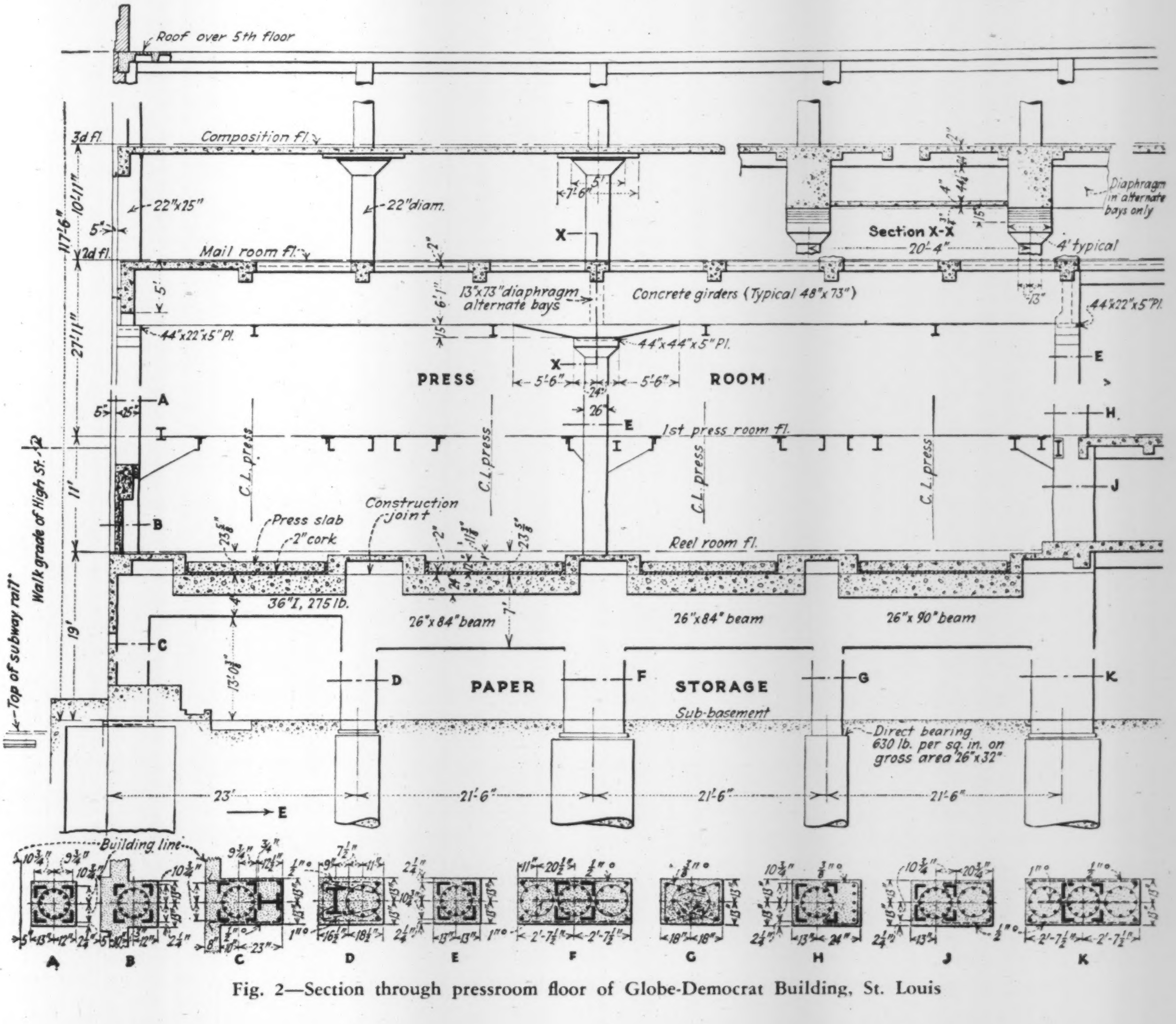

Roof over 5th floor
3d fl.
Composition fl.
2d fl.
Mail room fl.
22"x25"
22"diam.
5"
7'-6"
5'
X
Section X-X
20'-4"
4' typical
Diaphragm in alternate bays only
11'-6"
10'-11"
27'-1"
5'
6'-1"
13"x73" diaphragm alternate bays
Concrete girders (Typical 48"x73")
44"x22"x5" Pl.
44"x44"x5" Pl.
PRESS
ROOM
5'-6"
24"
26"
A
B
C
D
E
F
G
H
J
K
1st press room fl.
C.L. press
Construction joint
Press slab
2" cork
23 5/8"
Reel room fl.
36" I, 275 lb.
26"x84" beam
26"x84" beam
26"x90" beam
19'
11'
13'-0 3/8"
PAPER
STORAGE
Sub-basement
Direct bearing 630 lb. per sq. in. on gross area 26"x32"
Walk grade of High St.
Top of subway rail
23'
21'-6"
21'-6"
21'-6"
Building line
A
B
C
D
E
F
G
H
J
K

Fig. 2—Section through pressroom floor of Globe-Democrat Building, St. Louis

external diameter with 2-in. pitch, and twelve 1-in. diameter vertical bars.

The assumed conditions of maximum loading impose a design load of approximately 1,300,000 lb. on a section within the 31-ft. unbraced length of the column above the reelroom floor beams. This load includes the load from the pressroom floor brackets, which are attached to the columns. The proportion of resistance ascribed to the structural-steel element and to the reinforced-concrete element of these particular columns was about 70 and 30 per cent respectively.

The typical columns at the ends of the mail-floor girders are similarly built, but their structural-steel elements and their reinforced-concrete elements are of lighter design. For them 6x6-in. angles are used, and the percentage of resistance ascribed to the steel element is about 60 per cent of the total.

The reelroom floor is 19 ft. above the sub-basement, and it is of unusually heavy design on account of the great weight of the presses and pressroom equipment that it supports. The presses rest directly on reinforced-concrete slabs 12 in. thick and from 12 ft. 9 in. to 14 ft. 2 in. wide, which are insulated from the structure by 2 in. of cork. The structural slabs under these insulated slabs carry the loads to east and west beams between columns at the regular 21 ft. 6-in. column spacing. Their average superimposed design load, including the weight of the insulated slab, varies from 1,150 to 1,350 lb. per sq.ft., and their thicknesses vary from 24 to 27 in.

In general, the beams supporting the reelroom slabs are of reinforced concrete, and the end reactions from these beams are carried down to the foundations by concrete columns, which are built as independent columns at the intermediate column spacing and as supplementary columns at the beam ends abutting the composite columns.

Throughout the bay adjacent to High St. the reelroom floor beams are 36-in. 275-lb. steel sections, in order to provide proper clearance for the paper-handling equipment in the sub-basement. At the ends of these beams supplementary steel columns are employed. The sub-basement floor grade of the building is 29 ft. 3 in. below the walk grade at High St. and Franklin Ave., and 18 in. above the top-of-rail grade of the St. Louis Electric Terminal Railway Co.'s subway under High St. All foundations under columns supporting the superstructure of the building were constructed as open-well foundations extending to rock, which was encountered at an average depth of 22 ft. below the sub-basement floor.

Mauran, Russell & Crowell were the architects for the building. The structural engineering plans were prepared by the Martin Engineering Co. Fruin-Colnon Construction Co. did the excavating and foundation work. The Westlake Construction Co. was the contractor for the superstructure. All these organizations are located in St. Louis. The building is now completed, housing the publishing activities for which it was planned.

Drydock Reconstruction at Puget Sound Navy Yard

An Accelerated Public Works Project

Work begun the day after funds were available and completed in four months. Thirty-five year old timber dock badly decayed is relined with concrete

By CHARLES E. DICKEMAN
Lieutenant (C.E.C.) U. S. Navy, Puget Sound Navy Yard

With work started the day after funds were available, the reconstruction of the No. 1 drydock at the Puget Sound Navy Yard is an excellent example of what can be done by a public-works program toward the prompt and efficient placing of men at work. The manner of carrying out this project indicates that, contrary to popular belief, governmental activities need not be hampered by red tape, political influence or other obstructions. The present program was a part of a $940,000 appropriation in the first deficiency act of 1931 and provided full-time employment for a force averaging 700 men from February to June.

The No. 1 drydock at the yard was constructed in 1896, of a type known as the Simpson dock. Except for the concrete end section and subfloor, the structure was of timber. The heavy timber sidewalls were built on the natural slope of the ground and fastened to wood piles. It was 660 ft. long, 130 ft. wide at the coping and 57 ft. wide at the bottom, with a depth over the sill at high water of 30 ft. The foundation material is tightly packed sand and gravel interspersed with layers of thick blue clay changing to loose beach sand near the waterfront. It was built to accommodate cruisers, destroyers and smaller naval vessels.

For several years marked evidence of decay had been noted in the lining. At one end there was a pronounced bulge in the dock wall where the lining timbers had pulled away from the supporting piles. In addition, the altars and brace timbers showed evidence of decay, and in November, 1930, exploratory tunnels were driven through the sidewalls at various places to permit a more thorough investigation of the structure. It was found that the inside of the lining as well as the tops of the piles above mean tide level had been seriously attacked by rot and Ambrosia beetles.

The reconstruction of this drydock at an estimated cost of $400,000 was a part of the public-works program prepared by the navy in January, 1931, at the request of the administration, to afford unemployment relief during the following months. It was specified that plans, specifications, materials and construction work should be handled by the working forces of the navy yard that

Construction well advanced on new concrete lining. Concrete was deposited from bottom-dump buckets delivered by truck from yard central mixing plant. Forms in 24-ft. sections were re-used eight times

would otherwise have had to be reduced. On Saturday, Feb. 7, the bill making the money available for this project was signed and on the following Monday active work began with one shift. Two additional shifts started the succeeding day and 3 shifts were used from then on.

The plans prepared by the yard provided for extending the structure 13 ft., widening the bottom 10 ft. and adding a standard-gage track for cranes together with distributing systems for water, air, fuel and electricity.

The first work required the removal of the old timber lining. Considerable difficulty was experienced in tearing out the old altars which had been thoroughly cross-drifted to the bearing timbers. One 40-ton and one 50-ton crane were available for this work on the night shift and a 15-ton locomotive crane cleared up the debris on the day shift. About one million board feet of timber were removed.

The next operation consisted of removing the concrete that had been placed behind the altars for a height of 6 ft. from the floor. It was possible to blast out this concrete with 20 per cent dynamite without interfering with other work or the near-by buildings. The old sheet-piling was removed and a power shovel followed to excavate for the increased width of the new dock.

In spite of excessive rain during the early period of construction, which resulted in frequent slides in the natural clay and in the clay puddling behind the old lining, concrete placing was started within three weeks and was continued every day thereafter.

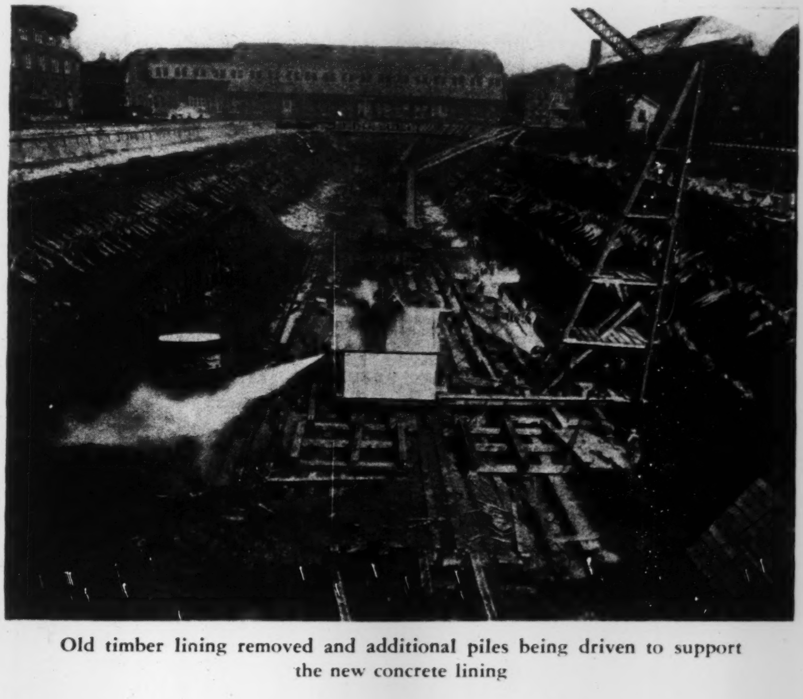
An interesting development resulted from the excessive amount of roughing required on the old subfloor concrete to provide for bond. About 50 pneumatic breakers were used almost continuously for this work. Continuous use for three shifts so fatigued the steel that frequent breakage occurred. Heat-treatment of the points for their entire length greatly reduced this breakage.

During most of the concrete work the formwork was done on the day shift and concreting was carried out on the two other shifts. Forms had been built in 24-ft. sections of 2-in. planks on 2x8-in. studs and were used eight times on the sides with very little repair and then cut to fit the nose of the dock. The reinforcing steel was made up in mats and lowered by crane behind the forms and tied into place.

Concrete was delivered from the yard central mixing plant using a mix of 1:2.1:3.54 and 5.75 sacks of cement per cubic yard. The strength of the concrete after 28 days averaged 4,440 lb. The concrete was discharged from the central plant mixer into cylindrical buckets equipped with lever-operated bottom dump gates. These buckets were delivered to the dock by truck and handled by crane. The maximum pour for a single shift was 320 cu.yd.

The maximum number of men employed on this particular project was 350, with an average of 225. The navy department specified that $275,000 worth of work should be completed by June 30, and the actual expenditure was $365,892.

All work in connection with this construction program, including the preparation of plans and specifications and the procurement of materials and labor and execution of the construction, was performed by the public-works division of the Puget Sound Navy Yard under the direction of Lieut. Commander B. Moreell (C.E.C.), U. S. navy public works officer. Lieut. Commander C. H. Cotter (C.E.C.), U. S. navy, was in charge of design and procurement of materials. The field work was in general charge of Lieut. Commander G. D. Wetsel (C.E.C.), U. S. navy, and the writer was in full charge of all field operations on the construction of the drydock. The dock was ready to receive a ship on June 9, 1931.



Old timber lining removed and additional piles being driven to support the new concrete lining

Winston-Salem Combines Incineration of Refuse and Garbage

A year's experience with a new incinerator plant shows satisfactory results—Auxiliary fuel was used only during three summer months of wettest garbage—Operating costs (excluding fixed charges) are $2.76 per ton, three-fourths of which is cost of collection

COLLECTION and incineration of combined garbage and refuse have been worked out in Winston-Salem, N. C., to meet the peculiar local conditions of an industrial city of 75,274 population by the census of 1930. Tobacco processing and manufacturing plants are the principal industries of the city, although there are a number of textile, furniture and other similar light industries. Nearly 60 per cent of the entire population of the city consists of operatives in these various plants. Upward of 35 per cent of the total population also are negroes.

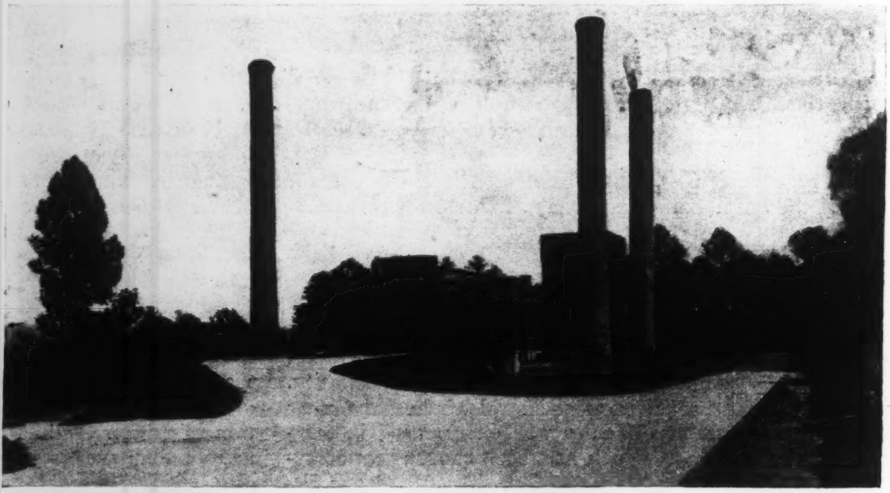


Fig. 1—Effective arrangement of approach and departure roads, facilitated by the nature of the site chosen, simplifies the operation of the Winston-Salem refuse incinerator plant. The three units have independent stacks

Long experience in local waste collection and disposal has led to a policy of requiring no separation of garbage from other household refuse in residential districts. In the central business district and the manufacturing areas, stores, office buildings, markets and industrial establishments are required to put their perishable wastes in separate containers from their dry rubbish. The combination of garbage and refuse from the residential districts might appear unnecessarily expensive to incinerate the more so as it includes large quantities of coal ashes during several months of the year; but with the type of industrial workers that makes up so large a part of the population, experience is to the contrary.

It has been found that the expense of collecting and incinerating the combined garbage and refuse is justified by the limited number of sanitary inspectors required. In fact, the local authorities doubt whether segregation could be enforced by any reasonable number of inspectors. On the other hand, there is no complaint from the public under the present system. Furthermore, no difficulty has been encountered during a year of operation (except during three months of the green garbage season) in burning the combined wastes without auxiliary fuel. The present incinerator was placed in service in November, 1930.

OPERATING COSTS OF GARBAGE AND REFUSE DISPOSAL AT WINSTON, SALEM, N. C.

COST OF COLLECTION

	Total	Per Ton
½ sanitary superintendent	$1,300.00	$0.05777
1 force foreman	1,625.00	.07222
Labor (1 foreman, 45 men, extra)	32,875.00	1.46111
Supplies	100.00	.00444
Repairs and maintenance small equipment	25.00	.00111
Transportation foreman ½ superintendent	450.00	.02
Miscellaneous	100.00	.00444
Truck, 15 regular, 1 extra	11,000.00	.48888
Tools	50.00	.00222
	$47,525.00	$2.11222

COST OF INCINERATION

	Total	Per Ton
¼ sanitary superintendent	$650.00	$0.0288
1 plant foreman	1,875.00	.0833
Labor, 10 men, extra helper	9,625.00	.42778
Supplies	200.00	.00888
Repairs and maintenance	400.00	.01777
Fuel, 75 tons @ $5	375.00	.01666
Power	700.00	.03111
Telephone	90.00	.00400
Water	210.00	.00933
Miscellaneous	50.00	.00222
Truck	400.00	.01777
Tools	150.00	.00666
	$14,725.00	$0.65444

SUMMARY OF OPERATING COST PER TON

Collection	$2.11
Incineration	0.65
Total	$2.76

Note—These figures do not include fixed charges (interest, amortization, depreciation and obsolescence). Assuming that the life of the plant will be the same as that of the bonds, the interest and sinking fund charges together would be 8 per cent on $286,000 or $22,880 a year.

Collection—Fifteen 2-ton trucks having 7-yd. hand-operated dump bodies, and a force of 45 truck drivers and helpers under a single foreman serve 15,000 dwelling houses and 1,300 business establishments. Collections from the business district and from markets are daily, from closely built residential districts three per week, from other districts semi-weekly. In the business district generally the collection crews pick up the containers from inside the premises, which is somewhat more expensive than where containers are placed on the curb, but it has eliminated practically all offense from the collection work.

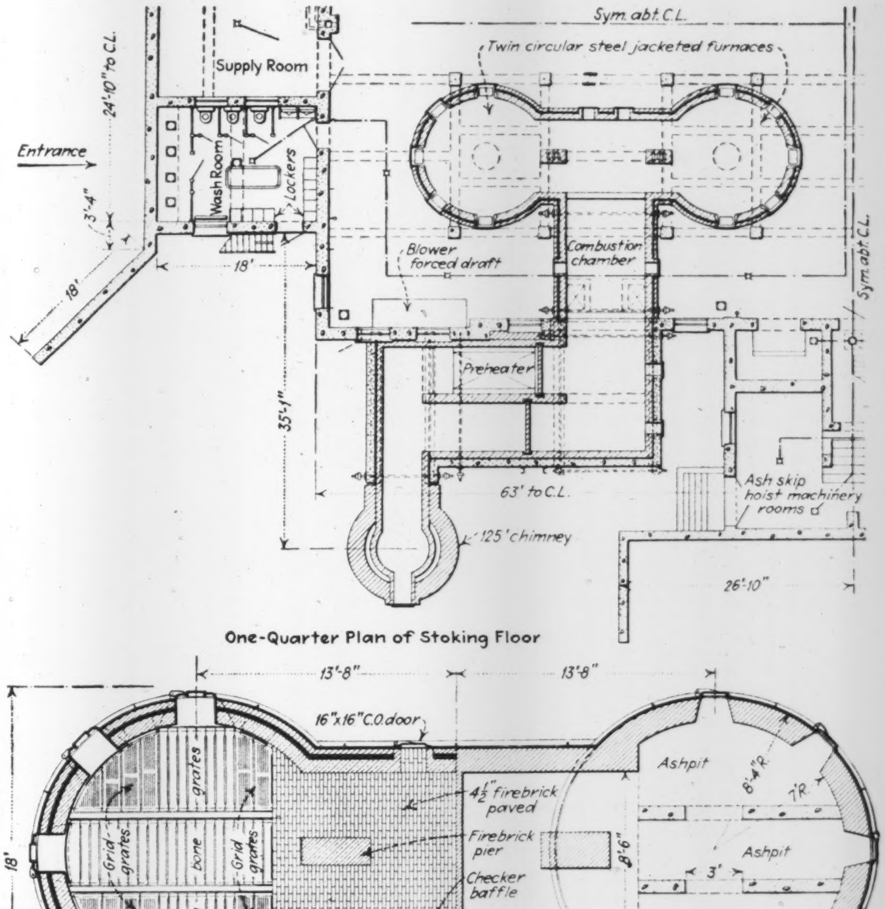
Trucks average about 30 miles and three loads of $1\frac{2}{3}$ tons per day. The maximum straight line haul is 5 miles, with an average of 3 miles. Due to travel up and down streets and into alleys, the actual haul is close to 5 miles as an average. The bulk of the hauling is over paved streets.

Incineration Practice — Selection of the site for the incinerator in a rolling, undeveloped wooded area at the edge of the city made possible the provision of loop concrete roadways that enable the trucks to enter and leave the plant without turning or backing and without mutual interference. The building, 71x121 ft., has space for four incinerator units, though only three have been installed, all of the Nye type. Each unit is served by a 125-ft. brick stack, with the natural draft supplemented by power blowers when necessary. The charging floor, at roadway level, is unobstructed by columns. Each of the twin cells of the incinerator units is charged by gravity directly from the trucks through a flush opening. Trucks enter the charging floor through either of two doors, over platform scales controlled in a weighing house at the entrance.

The three incinerators installed have a tested capacity of reducing to ash in 24 hours 500 tons of the combined garbage and refuse received. The actual load has averaged 75 tons daily, with a maximum of 107 tons; hence it has been possible to operate the plant on a single nine-hour shift. The force comprises eleven men, including the foreman and a driver who hauls the ash produced to a near-by fill.

Working a single shift means that the units must be fired up every morning. The ash is drawn from a unit as soon as it is cool. Then the unit is charged with one or more truckloads of straight combustible refuse to start the fire in it; as it becomes hot the collections of combined garbage and refuse are charged.

One exceptionally serious load on the incinerator is a


One-Quarter Plan of Stoking Floor

Half Plan, Furnace Above Grates

Half Plan, Furnace Below Grates

Section Across Combustion Chamber

Section on C.L. of Furnace

Sym. abt. C.L.
Twin circular steel jacketed furnaces
Supply Room
24'-10" to C.L.
Entrance
Wash Room
Lockers
3'-4"
18'
18'
Blower forced draft
Combustion chamber
Preheater
35'-1"
63' to C.L.
125' chimney
Ash skip hoist machinery rooms
26'-10"
Sym. abt. C.L.
13'-8"
13'-8"
16"x16" C.O. door
4½" firebrick paved
Firebrick pier
Checker baffle
Grid-grates
Herring-bone grates
Grid-grates
Ashpit
Ashpit
Ashpit
8'-4" R.
7' R.
8'-6"
3'
18'
Air duct
16" common brick
2'x2'-2" stoking door
16"x16" C.O. door
9" firebrick lining
3" insulation
4" common brick
No. 10 steel plate to building wall
8" [, buck stay with ⅞" tierod
4½" firebrick paved chamber
Forced draft inlet
11'-8"
36" charging chute
2" cement
1½" insulation
9" firebrick
6"x½" steel band
No. 10 steel plate
L, 4x6x⅜
Stoking door
3'-6" grates
Ashpit
16"x16" cast-iron door
8'
4'6"
3'
Combustion chamber
8' R.
8'-10"
Checker baffle
8'-10"
8' R.
4½"
2' R.
Air ducts

Fig. 2—Details of Winston-Salem incinerator

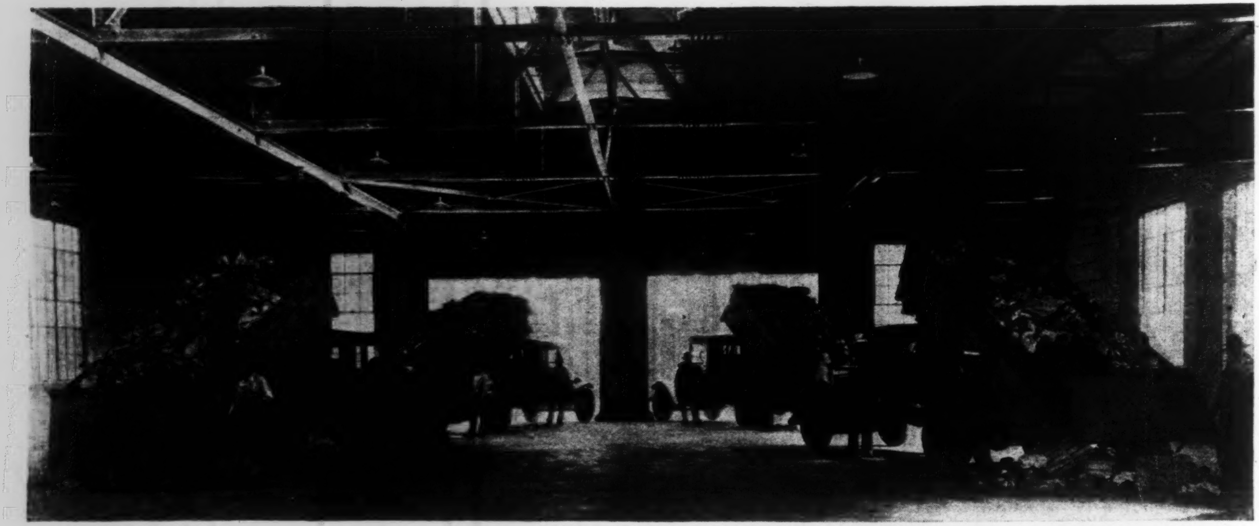


Fig. 3—Garbage and refuse is dumped from the collecting trucks direct into flush charging holes of the six incinerator cells. Trucks enter over platform scales and travel through unobstructed floor area to a separate exit driveway

charge of from 2 to 5 tons daily of screenings from the municipal sewage-disposal plant. These screenings run upward of 85 per cent water. They are delivered to the plant in ordinary garbage collection cans, from which they are charged directly into the units. With the latter first thoroughly heated with several loads of regular run of collections from the city and with a fire well built up, it has been found entirely practicable to dispose of these heavy charges of sewage screenings.

Ash and incombustible refuse from the incinerators are wheeled by hand to a hoist in a tower at one side of the building, where an overhead bin permits storage to smooth out the operation of the disposal truck. Thorough wetting down in this tower practically eliminates dust in handling.

Provision is made for auxiliary firing of the incinerators by wood, oil or coal, but this has had to be used only during three months of the wettest summer garbage.

Operating Cost—Financial operating results for the first nine months after the incinerator started are shown in an accompanying table. The cost of the operation of the incinerator *does not include fixed charges* (interest on $286,000, amortization, depreciation or obsolescence). These items also are not included in the cost of collection given.

Harry L. Shaner, commissioner of public works of Winston-Salem, prepared the general plans for the incinerator, supervised their execution and has charge of operation. The general contractor for the plant was the Nye Odorless Incinerator Co., Albany, Ga.

Incineration of Refuse Replacing Dumping in Birmingham, England

Refuse disposal in Birmingham, England, will be entirely by incineration when a building program now under way is completed, reports G. A. Makinson, U. S. consul to that city. The sole remaining refuse dumping area will then be abandoned and the city divided into six districts, each self-contained for collection and disposal purposes. Ten disposal plants are now in operation and two more are officially approved for construction. Before incineration, 45 per cent of dust, cinders and other material of low calorific value is removed from the refuse by screening. The fine floating dust liberated is forced beneath the fires, where it is burned. The tailings pass to the furnaces, which produce sufficient steam for all power used in the disposal plant. Mechanical clinkering has replaced hand labor. Crude clinkers are used for road material and filling. Crushed and graded clinkers go into clinker asphalt, clinker concrete blocks and paving slabs. Last year clinkers from the plant netted $33,600.

LETTERS TO THE EDITOR

Flood-Protection Benefits

Sir—In his mention of flood-protection benefits in *Engineering News-Record* of Oct. 1 Mr. Tibbetts touches on one of the most important and most perplexing problems connected with large flood-control projects. Important because the determination of benefits usually fixes the distribution of cost, and unless the total benefits exceed the cost the undertaking is not economically sound. Perplexing because of the indefiniteness and complexity of factors involved and because of a large array of confusing legal opinions on the subject. Fundamental principles are gradually evolving from court decisions, but some of these have not yet been solidly established.

Mr. Tibbetts' objection to basing benefits on the damage due to a single flood is well taken. Not only does this method neglect intangible losses but it may neglect benefits that are entirely unrelated to past flood damage. Physical flood damage may be a helpful guide in determining benefits, but it is in many cases entirely unsuitable as a direct measure of benefit. A simple illustration of the basic difference between benefit and damage is had in the case of low-lying, unimproved land adjacent to valuable improved land. The physical damage due to occasional flooding may be slight, yet complete protection from flooding may lift the market value of this land from almost nothing to a very considerable amount. In other words, flood-protection benefits may come not only from protecting existing values but from increasing them, or from creating new values. The fallacy of assuming that actual damage is necessarily a direct measure of the value of protection may also be illustrated by a purely accidental situation which is fairly common: Through an unknown vagary of the flood one building may be wrecked while that on an adjacent lot is only slightly damaged; obviously the damage in the two cases would not be a fair measure of their respective benefits.

The author's reference to certain flood losses as being indirect or intangible recalls the frequent use that has been made of these convenient words for dscribing benefits of an indefinite character. Here we come to perplexity indeed. A large part of the argument resulting from litigation revolves around the distinction between direct and indirect benefits. There is danger in setting up hard and fast classifications when in many cases there may be only slight if any distinction. Perhaps my thought may again be best illustrated by examples: (1) A house that was flooded has been protected from future floods; here is direct benefit, tangible, definite, real. (2) A neighbor's house on a knoll, although surrounded by water, was not flooded, but its market value depreciated greatly, and this value is restored and increased by flood protection; the benefit may be less in amount, but is it less direct or less real? Again, if the project protects waterworks, sewers, bridges or other municipal property, this is an indirect and perhaps small benefit to the resident who lives on a hill, but is it less tangible?

And now we may go a step farther. Large industries are located in the flood zone, and if not protected will remove their plants. Their payrolls represent a large proportion of the wages paid in the community, and this community would normally go to great lengths to attract such industries. Their removal would vacate many houses and depreciate real estate on the hill as well as in the valley. The city depends on its taxes for its existence as a political entity. If these facts are known, would the saving of these industries be a benefit to the community and to the resident on the hill? Would the benefit be speculative or real, tangible or intangible?

Cases might be cited almost indefinitely presenting various degrees of difficulty in evaluating the benefit. One more will be mentioned, to indicate a close and important relation that may exist between benefit and fundamentals of design. A difficult problem frequently is the decision as to the size of flood for which protection shall be provided. It is the basis of all design and determines the cost. In most cases, due to our short records and recent development of property values and concentration of population, a "maximum damage" flood has not yet occurred. Assume, for instance, that it is desirable to protect against a flood twice the size of the maximum recorded occurrence. The engineer reports this necessary for complete protection, and the community as a unit desires it, but an individual property owner objects to the finding of a special benefit on his particular property, which to his knowledge has never been flooded. Is this a speculative benefit? It is difficult of evaluation. Is it less tangible or less direct than that noted in the first example?

To give a concrete illustration of this problem: In 1926 several hundred lives were lost by drowning in a hurricane storm on the shores of Lake Okeechobee, Florida. Local plans provided for a levee with crest at El. 25 to 27. An independent study of the flood possibilities recommended a levee height of 32. This was sharply criticised as visionary and wastefully overcautious, even by some of the residents, who held the 1926 storm as the absolute maximum. In 1928 the region experienced a storm in which nearly 2,000 lives were lost, and the United States army engineers are now building a levee to a grade of 31. Engineering experience can cite many similar cases. It is evident from such experiences that the engineer must consider future possibilities as well as past occurrences, and that *benefits cannot be estimated from past damage alone.*

It may be well to add that the foregoing illustrations are not rare exceptions; they are the rule. Benefit is frequently defined as difference in value with protection and without protection. This is an excellent definition, but difficulty arises in translating it into dollars and cents values. Does the difficulty of evaluation make the benefit less direct, less definite or less tangible? Does it make the benefit speculative or less real?

Mr. Tibbetts could not, of course, give space in his excellent article to a discussion of details. My only purpose in this comment is to indicate that the determination of benefits is an important phase of flood-control enterprises which is not as simple as it may seem. The same may be said of damages, a fact which has recently been developed beyond doubt on the Mississippi project.

C. A. Bock,
Vice-President, Dayton Morgan Engineering Co.
Dayton, Ohio,
Oct. 28, 1931.

Cross Method Applied to Frames Under Vertical Load

Sir—The article by John E. Goldberg entitled "Vertical-Load Analysis of Rigid Building Frames Made Practicable" (*ENR*, Nov. 12, 1931, p. 770), was read with much interest. The author's scheme of applying the method to this type of problem is very ingenious. I had realized that those who have used the slope-deflection method sufficiently to be absolutely familiar with it could handle it with great facility. I believe, however, that a solution of the problem illustrated can be made with greater ease and rapidity by the Cross method of balancing moments.

A complete solution of the bent shown in Mr. Goldberg's article by the latter method follows. The method is completely described in an article by Prof. Hardy Cross in the May, 1930, *Proceedings* of the American Society of Civil Engineers, and it has been amplified since by discussion in *Proceedings*. All the data are taken from Mr. Goldberg's article, and the same convention of signs is used for convenience in comparison. The summation at the end of the first approximation gives results sufficiently accurate for practical purposes, but one or more cycles of approximation may be carried through if desired. It takes only a very few minutes to carry through an approximation.

E. A. MacLean,
Designer, Maine Highway Commission.
Augusta, Me.,
Dec. 4, 1931.

Joint	*A*				*B*					*C*				*D*				
Member	*AC*	*AB*	*AM*	Unbal.	*BD*	*BB'*	*BN*	*BA*	Unbal.	*CE*	*CD*	*CA*	Unbal.	*DF*	*DD'*	*DB*	*DC*	Unbal.
K	1.8	3.1	3.1	8.0	3.1	2.3	5.1	3.1	13.6	1.0	3.0	1.8	5.8	1.8	2.3	3.1	3.0	10.2
Per cent	22	39	39		23	17	37	23		17	52	31		18	23	30	29	
Fixed moment		+62.5		+62.5		+21.0		—62.5	—41.5		+62.5		+62.5		+21.0		—62.5	—41.5
Balancing	—13.7	—24.4	—24.4		+9.5	+7.1	+15.3	+9.5		—10.5	—32.5	—19.5		+7.5	+9.5	+12.5	+12.0	
Distributing	—9.7	+4.7		—5.0	+6.2	—3.5		—12.2	—9.5	—6.2	+6.0	—6.8	—7.0	+4.6	—4.7	+4.7	+6.2	—11.8
Balancing	+1.0	+2.0	+2.0		+2.2	+1.6	+3.5	+2.2		+1.2	+3.6	+2.1		+2.1	+2.7	+3.5	+3.4	
Summation at end 1st approx	—22.4	+44.5	—22.4	—0.3	+17.9	+26.2	+18.8	—63.0	—0.1	—15.5	+39.6	—24.2	—0.1	+14.2	+28.2	+20.7	—63.3	—0.2
Distributing	+1.1	+1.1		+2.2	+1.8	—0.8		+1.0	+2.0	+0.4	+1.7	+0.5	+2.6	+2.1	—1.4	+1.1	+1.8	+3.6
Balancing	—0.4	—0.9	—0.9		—0.4	—0.4	—0.8	—0.4		—0.4	—1.4	—0.8		—0.6	—0.8	—1.1	—1.1	
Summation at end 2d approx	—21.7	+44.3	—23.3	+0.3	+19.3	+25.0	+18.0	—62.4	—0.1	—15.5	+39.9	—24.5	—0.1	+15.7	+26.0	+20.7	—62.6	—0.2

Joint	*E*				*F*					*G*			*H*			
Member	*EG*	*EE'*	*EC*	Unbal.	*FH*	*FF'*	*FD*	*FE*	Unbal.	*GH*	*GE*	Unbal.	*HH'*	*HF*	*HG*	Unbal.
K	1.0	2.9	1.0	4.9	1.0	2.3	1.8	2.9	8.0	1.3	1.0	2.3	2.2	1.0	1.3	4.5
Per cent	20	60	20		12	30	22	36		57	43		49	22	29	
Fixed moment		+62.5		+62.5		+21.0		—62.5	—41.5	+30.0		+30.0	+10.0		—30.0	—20.0
Balancing	—12.5	—37.5	—12.5		+5.0	+12.5	+9.1	+15.0		—17.0	—13.0		+9.8	+4.4	+5.8	
Distributing	—6.5	+7.5	—5.2	—4.2	+2.2	—6.2	+3.7	—18.7	—19.0	+2.9	—6.2	—3.3	—4.9	+2.5	—8.5	—10.9
Balancing	+0.8	+2.6	+0.8		+2.3	+5.7	+4.1	+6.8		+1.9	+1.6		+5.3	+2.4	+3.2	
Summation at end 1st approx	—18.2	+35.1	—16.9	0.0	+9.5	+33.0	+16.9	—59.4	0.0	+17.8	—17.6	+0.2	+20.2	+9.3	—29.5	0.0
Distributing	+0.8	+3.8	+0.6	+5.2	+1.2	+2.8	+1.1	+1.3	+6.4	+1.6	+0.4	+2.0	+2.7	+1.2	+1.0	+4.7
Balancing	—1.0	—3.1	—1.1		—0.8	—1.9	—1.4	—2.3		—1.2	—0.8		—2.3	—1.0	—1.4	
Summation at end 2d approx	—18.4	+35.8	+17.4	0.0	+9.9	+33.9	+16.6	—60.4	0.0	+18.2	—18.0	+0.2	+20.6	+9.5	—29.9	+0.2

NEWS OF THE WEEK

Alameda County, Calif., Provides Unemployment Relief

The board of supervisors of Alameda County, Calif., has approved an unemployment relief program providing immediate work for at least 1,000 men through the expenditure of $50,000 taken from the general fund, for road construction. The men will be employed on a weekly basis at $4 a day. To permit the employment of the greatest number, the men will be engaged in groups, each group working six days at a time.

◆

Clearances Set for Future Mississippi River Bridges

Decisions of the Chief of Engineers as to horizontal and vertical clearances of future bridges to be built over the Mississippi River, between Cairo, Ill., and the upper limits of New Orleans have been announced.

The clearance requirements are as follows: horizontal, a clearance of 750 ft., measured at right angles to the ordinary path of vessels for the principal navigation span. Between Cairo and the upper limits of Baton Rouge harbor, one additional span over water of navigable depth with a horizontal clearance of not less than 500 ft., will be required. Between the upper limits of Baton Rouge harbor and the upper limits of New Orleans, at least two additional spans over water of navigable depth with a horizontal clearance of not less than 500 ft. will be required.

Vertical clearances will be as follows: from Cairo to Vicksburg, 55 ft.; from Vicksburg to the upper limits of Baton Rouge harbor, 64 ft.; from the upper limits of Baton Rouge harbor to the upper limits of New Orleans, 133 ft.

◆

California Registration Board Designates Structural Engineers

Under authority of the 1931 amendment to the California registration act, the board has issued permits to fourteen registered civil engineers to use the title "structural engineer." This was the initial action of the board on this question, but the number of permits will probably be considerably increased, as about 250 applications have been filed requesting the legal right to use the term.

The action of the board is a result of the recently added section of the act which provides that "no person shall use the title 'structural engineer' unless he is a registered civil engineer in this state and furthermore unless he has been found qualified as such structural engineer according to the rules and regulations established therefor by the board of registration for civil engineers."

In establishing qualifications of those registered civil engineers given permission to use the title the board adopted rules requiring three years of responsible charge of structural engineering work in connection with buildings as a prerequisite to the filing of an application for examination. Where the applicant has had five years of such responsible charge and submits evidence of a nature and character satisfactory to the board that he is qualified, the right to use the title is granted without examination.

The emphasis upon structural engineering work in connection with buildings in California's engineers' registration matters is due to certain inconsistencies which exist in the civil engineers' act and in the architects' act in California. The principal effect of the amendment is to give to any engineer who has the right to use the title structural engineer and who signs his drawings as such all the rights which are granted registered architects.

◆

Portland, Ore., Has Plan to Aid Unemployed Engineers

Financial relief for unemployed engineers in distress and jobs for such of them as can be placed are the principal objects of organization machinery that has been set in motion in Portland, Ore., by the Oregon Technical Council, composed of representatives of all the engineering groups. Its machinery has been set up to take care of all classes of engineers in lieu of having separate plans for each group.

The plan contemplates taking subscriptions from employed engineers monthly for six months, adding to these such funds as can be raised elsewhere and thus creating a fund to loan to needy unemployed engineers at 4 per cent interest. It is expected that these loans will be repaid and proportionate returns made to subscribers.

◆

Secretary Doak Fixes Wages on Salt Lake City Federal Buildings

A ruling by Secretary of Labor William N. Doak establishes the wage scale in connection with work being done by the Orndorff Construction Co. on the postoffice and the veterans' hospital in Salt Lake City, to conform with the prevailing scale in that city. By it the wage of plasterers is reduced from $11 to $10 a day and that of hoisting engineers is raised from $8 to $9 a day.

Secretary Doak's ruling is made under the provisions of the Bacon-Davis law.

Five-Day Week for Two Counties in California

The five-day week plan as recommended by the impartial wage board for San Francisco and Alameda counties, Calif. (*ENR*, Oct. 29, p. 707), has been approved by the General Contracting Association. All building trades will go on a five-day working basis, with double pay for Saturday, beginning Jan. 1.

◆

Paper Company Plans $3,000,000 Development on Hudson River

Plans for a $3,000,000 hydro-electric development by the International Paper Co., at Corinth, N. Y., involving the construction of a dam creating a 6-mile lake in the Hudson River are in the preliminary stages. The company has obtained from Corinth officials flowage rights in the Hudson on village property. The new plant would supplant both the present Curtis dam developed in 1911 and 1912, and the second dam of 1913.

Two plans have been proposed. One would place the dam on the site of the present one, raising the river to the height of the Curtis Falls. The other would erect it several hundred feet above that site. In either case the old Curtis dam would be destroyed. Between the two at present there is a drop of about 40 ft.

◆

Los Angeles to Build 60,000-Kw. Steam-Generating Plant

The board of water and power commissioners of Los Angeles, Calif., will call soon for bids for the construction of a 60,000-kw. steam-generating plant to be erected at Wilmington, Los Angeles harbor. The estimated cost of the plant, to be the first unit of a proposed three-unit plant with ultimate capacity of 180,000 kw., is $7,000,000. There is on hand, it is announced, about $1,000,000, and it is expected that the rest of the cost of the initial unit will be paid for out of earnings.

◆

Silver Creek Water Bond Issue Fails in Sacramento

At a special election Dec. 16 in Sacramento, Calif., a proposal to float $12,600,000 in bonds to finance the construction of the Silver Creek water project was defeated. The vote was 13,587 in favor to 7,871 against, a majority of 5,716 votes for the bond issue but 717 votes less than the required two-thirds majority.

Gen. Brown Reports on Flood-Control Labor Conditions

MAJOR GEN. Lytle Brown, Chief of Engineers, has investigated complaints of labor conditions in connection with work in the Mississippi Valley (see *ENR*, Dec. 10, p. 945) and has made the following report to the secretary of war:

Recently there was published in the press sensational articles emanating from representatives of the American Federation of Labor. These articles indicated, to use similar language, that a "hideous condition of slavery" existed among the contractors' employees in the Mississippi Valley.

I saw no specifications in these newspaper articles. They came out while I was on the work on the Mississippi. I had seen no conditions warranting the statements made, but I ordered at once a searching investigation on the general lines indicated in the papers.

Later I received from you a report sent to you by the President of the American Federation of Labor. This report made by representatives of the American Federation of Labor contained some specific charges. These charges were sent to the president, Mississippi River Commission, for detailed investigation.

The general investigation has been completed. It is based on sworn testimony by practically every United States inspector on the work submitted in the form of affidavits. These affidavits are in this office. The remarks of the district engineers and the president of the Mississippi River Commission on the evidence produced are furnished herewith.

Chief of Engineers' Findings

I find that:

There is no evidence whatever to show that any violence has been offered to any man by contractors or contractors' agents.

The labor is working at its own free will and is under no compulsion as to labor or place of living.

In some cases labor is compelled to purchase from contractor's commissary as a condition of employment.

The wages of common labor are in some cases relatively low.

The hours of labor in isolated cases are unreasonably long.

In general, the charges that I have seen in the newspapers purporting to come from representatives of the American Federation of Labor are misleading as to serious general misconduct on the part of the men engaged in the construction of levees on the lower Mississippi River.

Report will be made later on any specific cases of misconduct on the part of anyone against labor on the flood-control work on the Mississippi River that may emerge as a result of investigation of specific charges made by the representatives of the American Federation of Labor.

Some Abuses to Be Remedied

Since no general misconduct is developed by this investigation, no general action will be taken. In certain specific cases I regard the hours of work as unreasonably long. I will direct that they be shortened except in cases of grave emergency.

I consider it improper for contractors to dispose of subsistence or supplies in their commissaries by means of forced sales to labor, and will direct that all such cases be terminated at once.

Specific action will be taken to correct specific cases of wrong-doing whenever they are discovered. I have ample power to do this.

◆

Increase in Federal Aid for Relief Work Opposed

Large increases in expenditures of federal funds as a means of unemployment relief and of stimulating business revival is opposed by the committee on program of federal public works of the President's Organization on Unemployment Relief. The committee is headed by James R. Garfield.

The committee finds that the ten-year plan of federal construction begun in 1926 has been speeded up to have it completed in seven years and that no further speeding up can be made effective for unemployment relief this winter. It further declares that the belief that business revival will be stimulated by large expenditures of public money is unsound. Consequently the committee is opposed to a large federal bond issue as ineffective for that purpose and as tending to demoralize the market for municipal and other necessary bond issues.

Loans of federal money to states and their subdivisions for expansion of their construction programs also are opposed as being unsound in principle and destructive of local responsibility. No increase of federal aid for highway construction beyond the amounts recently appropriated should be made, but the committee believes that the allocation of road appropriations should be discretionary instead of being fixed by law.

The primary obligation for relief work is upon the local political division, according to the committee, and little can be done by the federal government to ease that load.

◆

Progress on Brownwood Dam, Texas

Satisfactory progress is being made on the Brownwood dam, on Pecan Bayou, 11 miles north of Brownwood, Tex., and the contractor, the Standard Paving Co., Tulsa, Okla., employing 250 men and working double shifts, expects to complete the work before the scheduled time, June 1, 1932.

The dam, which is an earthfill structure, will be 1,600 ft. long, 85 ft. high and will contain about 770,000 cu.yd. of fill. The project involves the expenditure of $2,500,000 and includes a concrete-lined canal to be built from the dam site to the city of Brownwood after the dam is completed, which will furnish water for domestic and commercial purposes as well as irrigating some 25,000 to 30,000 acres of farm land.

Large Bond Issue For Public Works Before U.S. Senate

A "PROSPERITY bond issue" of $5,500,000,000 and a great expansion of public-works construction under the direction of an administrator of public works, is proposed in a bill introduced into Congress by Senator La Follette last week. The proposal is an emergency measure for the relief of unemployment. The bonds are to be 4¼ per cent maturing in ten years and paid off by a surtax of 2 per cent on incomes in excess of $5,000.

Public Works Administration

To speed up federal construction work an administrator of public works is established, reporting to the President, and all the principal bureaus and government agencies having charge of public works are transferred from their present departments to his control. This includes the Bureau of Public Roads, the Reclamation Bureau, the office of the Supervising Architect and all civil construction under the Corps of Engineers, including the Mississippi River work.

In order that no delay may be involved by the change all unexpended balances of appropriations for work under the charge of these federal agencies are also transferred to the administration of public works. The administrator is authorized to consolidate and reorganize all services under his charge. All employees of the government in the transferred bureaus are automatically transferred to the jurisdiction of the administrator. This includes all army engineers on river and harbor work, all U. S. engineer officers, the Mississippi River Commission and the California Debris Commission.

Emergency Program

The bill proposed to distribute the bond issue as follows:

As temporary loans to states to meet requirements that federal funds be matched by state funds, $250,000,000 for grade-crossing elimination and $150,000,000 highway bridge construction.

For federal work: $200,000,000 for rivers and harbors; $275,000,000 for new public buildings; $50,000,000 for forest roads; $25,000,000 for irrigation; $100,000,000 for remodeling public buildings.

In addition to regular appropriations for federal-aid highways, $1,000,000,000, of which $100,000,000 shall be available for meeting 50 per cent of the cost of grade-crossing eliminations.

There shall be used by the administrator $3,750,000,000 for making loans to states and their civil subdivisions for federal-aid highways, state, county and municipal highways, construction of bridges, construction of water supply and sewage disposal, construction of flying fields, parks and public buildings.

for grade-crossing elimination, and reforestation.

Loans are to be for not more than ten years and at a rate of interest three-fourths of one per cent above the average rate at the time the bonds are issued, but not more than 5 per cent.

The administrator also may loan $100,000,000 to limited-dividend corporations for housing. All loans are to be passed upon by an emergency finance board of three members.

The bill provides that the act shall go into effect immediately except that the transfer of federal agencies shall not take place until 30 days after it becomes effective.

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San Francisco Names A. J. Cleary Chief Administrative Officer

Under the terms of the new charter to go into effect Jan. 8, 1932, Mayor Rossi, of San Francisco, Calif., has appointed Alfred J. Cleary, for the past year his executive secretary, as chief administrative officer of the city. The position, which carries a salary of $12,000 a year, entails jurisdiction over eleven municipal departments and offices, including those dealing with public works, health, purchasing, finance and records, and electricity. A summary of the new charter, of the "strong-mayor" type, appeared in *ENR* April 9, p. 623.

Mr. Cleary, a graduate of the University of California, served the city from 1908 to 1921, starting as a draftsman and working up through several grades to become chief assistant engineer. During this period he was in charge of construction on the Hetch Hetchy project of San Francisco's water-supply system. In 1921 he resigned to enter private practice, serving, among others, the State of California and the Construction Company of North America, contractors on the Hetch Hetchy job. He was appointed executive secretary to Mayor Rossi early in 1931. Mr. Cleary is a director of the American River Hydro-Electric Co., and a member of the American Society of Civil Engineers.

◆

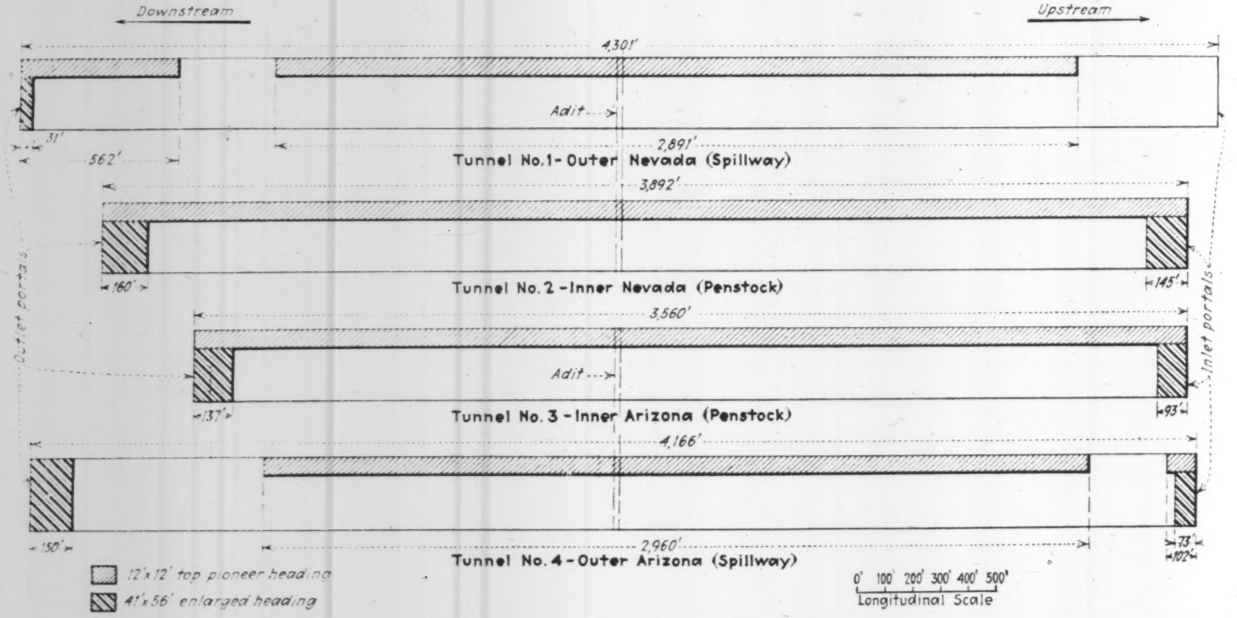
Additional Basins to Be Built at St. Louis Water Plant

Extensions are being planned for the Howard Bend purification plant of the St. Louis water department that will increase the capacity of the plant from 55 m.g.d. to 80 m.g.d. An additional sedimentation basin, 330x406 ft., is to be built adjoining the two now in use. Additional pretreatment capacity will be provided by the construction of two more presedimentation basins and two coagulation basins. Each of these new basins will be 150 ft. square and will be similar to those now in use.

Philadelphia Regional Plan Is Completed

Completion of the Philadelphia regional plan is announced by the Regional Planning Federation of the Philadelphia Tri-State District. Early in 1928, $600,000 was raised for a three-year period ended July, 1931. More than 98 per cent of the money pledged was paid in and the affairs of the federation were so handled that enough remained to keep it in operation six months longer. The directors have voted to continue the work of the federation organizing the county associations in the eleven counties comprising the district with a view to making the plan a reality. Funds for 1932 expenses are to be raised shortly. Samuel P. Wetherill, president, considers this follow-up work more important than making the plan.

Will H. Connell, executive director, stated in his recent annual report that the plan, formulated on the basis of requirements for 50 years by the technical advisory committee comprising 200 state, county, municipal and private consultants after 400 meetings were held, reflects the best collective ideas adjusted to the local and over-all needs of the region. The report soon to be issued and to be presented to the federation will be a 500-p. volume, one-third illustrations. The plan will be reproduced in county units in colors at a scale of 1 in. to the mile.



STATUS OF HOOVER DAM DIVERSION TUNNELS, DEC. 12, 1931

The above chart shows the excellent progress made to Dec. 12 in driving the four 56-ft. diversion tunnels at Hoover Dam. Two tunnels lie on each side of the river. After serving as diversion tunnels during the construction of the dam, the inner tunnels, next to the river, will be converted to penstocks and the outer two to spillway tunnels. The general scheme followed in driving is to drive a 12x12-ft. top center pioneer heading, followed by a 41x56-ft. enlarged heading, leaving a 15-ft. bottom bench to be taken out later. The top headings were started from adits driven into the canyon walls about mid-point of the tunnels, and from six of the eight portals. At the outlet of tunnel No. 4 no pioneer tunnel was driven, the enlarged heading being carried with only a short top heading. The four tunnels total 15,919 ft. in length. A total of 13,967 ft. of pioneer headings and 789 ft. of enlarged headings had been driven up to Dec. 12.

Gardner Stewart Williams

Gardner Stewart Williams, consulting engineer, of Ann Arbor, Mich., distinguished by his many professional achievements and by his society activities and contributions, died on Dec. 12, 1931, at the age of 65. (See *ENR*, Dec. 17, p. 982.)

Gardner Williams was born in Saginaw, Mich., and was graduated from the engineering college of the University of Michigan in 1889 (C. E., 1899).

He was civil engineer to the board of water commissioners of Detroit from 1893 to 1898, and professor of experimental hydraulics at Cornell University and in charge of the hydraulic laboratory from 1898 to 1904; from 1904 to 1911 he was professor of civil, hydraulic and sanitary engineering at the University of Michigan, and head of the department of civil engineering. Since 1911 he had been a private consultant with headquarters at Ann Arbor.

Mr. Williams was recognized as one of the country's leading authorities in the field of hydraulics. While civil engineer to the board of water commissioners he made an extensive investigation of the flow of water in pipes in collaboration with Clarence W. Hubbell, consulting engineer, of Detroit, and George H. Fenkell, present manager of the department of water supply. A paper on this work was awarded the Norman medal of the American Society of Civil Engineers in 1902.

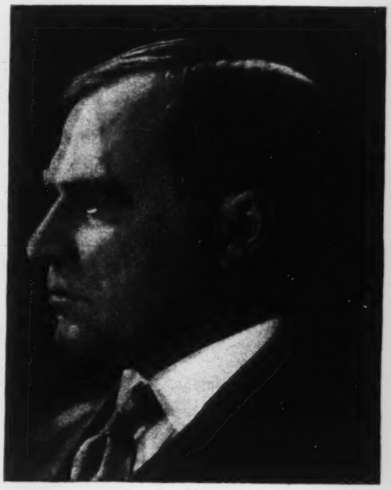
While at Cornell he performed outstanding hydraulic investigations on the flow of water over dams in cooperation with John R. Freeman, consulting engineer. He was a member of the International Waterways Commission from 1903 to 1905.

In the field of dam design Mr. Williams displayed marked originality. He designed and built the first dome dam in this country, the Six Mile Creek Dam at Ithaca, N. Y., about 30 years ago. The unique features involved in this type of design remained unused elsewhere, at least in any structure of importance, until adopted for the Coolidge Dam across the Gila River, near San Carlos, Ariz. Mr. Williams was also a pioneer in the building of multiple arch dams in this country. His last multiple arch dam was the Magnitogorsky, on the Ural River, in Russia, which contains 101 arches and has a total overall length of about 3,250 ft.

In waterpower plant design Mr. Williams was among the first to use the vertical waterwheel in open flume scroll settings, direct-connected to an electric generator; and he also made important contributions toward the development of the stream line draft tube.

He was an early advocate of the development of the St. Lawrence waterway to the sea and of the waterpower connected therewith. He was recognized as an expert on the hydraulics of the Great Lakes, and was an advocate of the regulation to control lake levels. During the last years of his life he devoted much time to the hydraulics of the Mississippi River and proposed straightening and deepening the channel as an alternative to levee construction, as a means of controlling flood and aiding navigation.

Mr. Williams was a director of the American Society of Civil Engineers from 1908 to 1910, and a vice-president from 1914 to 1915. He was a charter member of the American Institute of Consulting Engineers. From 1921 to the time of his death he was a representative of the Detroit Engineering Society on American Engineering Council, and vice-president of the council since 1923. In this relationship he was an active worker for a national public-works department. In 1931 he was chairman of the council's committee on government reorganization, and on flood control, and a member of the committee on water resources and control.


Gardner S. Williams

He was the author of the section on "Hydraulics" in American Civil Engineers' Handbook, and jointly with the late Allen Hazen, consulting engineer, of New York, of "Hydraulic Tables," and of a long list of professional papers and discussions.

During the World War Mr. Williams served on the committee on industrial preparedness under the Council of National Defense, and in 1917 acted as chief engineer on Camp Beauregard construction, Alexandria, La.

Mr. Williams was a successful teacher of engineering and an advocate of high standards in engineering education; he was a thorough and untiring worker in the field of hydraulic investigation. In later years he devoted much effort to the liberalization and broadening of the purposes and scope of engineering organizations and through American Engineering Council rendered valuable public service. His death was untimely. In his passing the engineering profession has suffered the loss of an outstanding character and a virile leader.

LOUIS E. AYRES.

WASHINGTON NOTES

By PAUL WOOTON

Washington Correspondent

Bigger Appropriations for River Projects Already Begun Is Urged at House Committee Hearings

PRIMARY emphasis in future rivers and harbors legislation should be placed on larger appropriations for projects already adopted, according to the views expressed at the preliminary hearing of the House rivers and harbors committee. Representative Mansfield, of Texas, chairman, takes the position that better results can be secured by expediting the present program than by scattering the appropriation over a large number of separate projects.

Bills introduced in both houses call for a $500,000,000 bond issue to make possible the early completion of projects now authorized. The general opinion is that these bills will not pass, but that the fact that they have been submitted will tend to bring about increases in the regular rivers and harbors bill.

At the same time, new projects will be submitted. Chief among these will be the proposed ship canal across the upper end of Florida, which would shorten sailing time between the Gulf and north Atlantic ports by four days. A survey of the routes proposed is now being completed by the army engineers. It has been estimated that such a canal, capable of accommodating deep-sea vessels, would cost half a billion dollars.

Western Pacific Line Into San Francisco Postponed

The Western Pacific Railroad has been granted an extension from Jan. 1, 1932, to Jan. 1, 1933, in which to commence construction of its projected bridge line into San Francisco from a connection with its main line at Niles. In requesting the extension of time, the carrier advised the Interstate Commerce Commission that negotiations for acquisition of traffic rights over the Southern Pacific's Dumbarton bridge across the bay are progressing satisfactorily, but that there is no prospect of an agreement for at least three months. The Western Pacific also stated that undertaking the project should be deferred at least a year in view of the difficulty of financing it under present conditions.

Unemployment Situation in Texas

In a tabulated summary of unemployment relief investigation by the Texas state board of health covering 64 municipalities with an aggregate population of 608,000, the needy men or families reported averaged 5 per cent. The survey was made in an attempt to stimulate committees to do sanitary work, but in 52 towns no such work is contemplated, although in all but fifteen towns some kind of sanitary work is reported as needed. In 37 cities there are no relief organizations, but only half a dozen places have no organization to handle unemployment. Most cities have welfare organizations of some kind. The work contemplated includes water and sewer extensions, sewage works, street cleaning and garbage removal. Dallas, with 260,000 population, has 15,000 men unemployed and will give work on sewers and garbage. Amarillo, a city of 45,000, has 500 needy families, but has no work contemplated or needed. Corsicana, with 15,200, has 1,100 needy men, has no needed work, but is considering municipal organization. Wichita Falls, with 43,700 population, has no needs or sanitary work contemplated for the 1,000 needy men.

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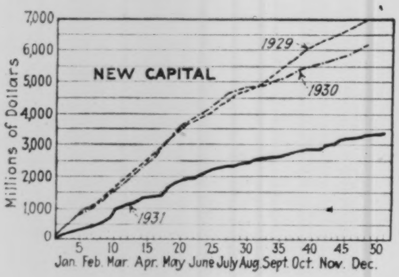
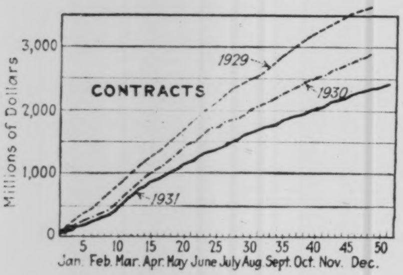
Capital and Contracts

No private issues of new capital were in evidence in the securities market for the week ended Dec. 26, making the third consecutive week in which all bonds issued were for public projects. The total for the week of Dec. 26 was $64,000,000, compared with $4,000,000 for the preceding week. The weekly average for December was $23,000,000, against $43,000,000 in November and $73,000,000 for December, 1930. Cumulatively, the total for Jan. 1 to Dec. 26, inclusive, is $3,388,000,000, compared with $6,096,000,000 in the comparable period of 1930.





COSTS AND CONTRACTS

ENR Index Numbers

Cost		Volume	
Dec. 1, 1931	**166.23**	**Nov., 1931**	**180**
Nov. 1, 1931	169.28	Oct., 1931	229
Dec. 1, 1930	196.86	Nov., 1930	207
Average, 1930	202.85	Average, 1930	260
Average, 1929	207.02	Average, 1929	317
1913	100.00	1913	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Dec. 31, with some comparisons, total as follows:

(In Thousands of Dollars)

	Dec. 31,	Average of Last Four Weeks	
Buildings	1931	1931	1930
Industrial	$290	$1,417	$2,926
Other	4,520	7,384	18,134
Streets and roads.	3,209	5,025	6,420
Other construction.	11,977	10,141	15,748
Total	$19,996	$23,968	$43,228

Total, all classes, Jan. 1 to Dec. 31:

1931	$2,452,776
1930	3,173,259

◆

$6,000,000 Highway Program Proposed in Massachusetts

The Massachusetts department of public works has made its suggestions to the state legislature for launching its three-year $6,000,000 highway improvement program. Boulevards, highways, grade separations and traffic circles are included in the numerous recommendations. The high points are plans for construction of a state highway from Alewife brook parkway, Cambridge, to Concord, and a new highway from Quincy to Boston, to cost $525,000.

SOCIETY CALENDAR

AMERICAN ROAD BUILDERS' ASSOCIATION, Washington, D. C.; annual convention and road show, Detroit, Mich., Jan. 9-15.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; annual meeting, Jan. 19-22, New York City.

AMERICAN WOOD PRESERVERS' ASSOCIATION, Chicago; annual meeting, St. Louis, Jan. 26-29.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, Washington, D. C.; thirteenth annual convention, Jan. 18-21, Milwaukee, Wis.

NATIONAL CRUSHED STONE ASSOCIATION, Washington, D. C.; fifteenth annual convention and exposition of quarry equipment and machinery and supplies, Pittsburgh, Pa., Jan. 19-22.

NATIONAL PAVING BRICK ASSOCIATION, Washington; annual meeting, Chicago, Feb. 10-12.

NATIONAL SAND AND GRAVEL ASSOCIATION, Washington; annual meeting, Pittsburgh, Jan. 27-29.

CHARLOTTE (N. C.) ENGINEERS CLUB recently elected the following officers for 1932: president, E. E. Williams; vice-president, J. S. Cothran; secretary, H. G. McConnell; treasurer, W. E. Vest.

NEW MEXICO SECTION, American Society of Civil Engineers, has elected officers for 1932 as follows: president, R. G. Hosea, Albuquerque; first vice-president, W. C. Davidson, Santa Fe; second vice-president, E. L. Barrows, Santa Fe; secretary-treasurer, W. B. Ream, Albuquerque.

TACOMA SECTION, American Society of Civil Engineers, has elected the following officers for 1932: president, C. E. Putnam; vice-president, W. A. Kunigk; secretary-treasurer, Julian Arntson.

AT A MEETING of members of the steel structural industry held in London early in November, the decision was made unanimously that a new organization, to be known as the National Federation of Bridge and Structural Engineers, should be formed. The federation will direct much of its efforts to the improvement of the conditions affecting the supply and delivery of steel work for all classes of public and private contracts. James Halliday, of Francis Morton & Co., Ltd., was elected chairman and E. A. Wilson, of Archibald D. Dawnay & Sons, Ltd., vice-chairman.

Texas to Spend $45,000,000 on Roads in 1932

With about $45,000,000 available for road construction in Texas during 1932, the state highway commission is already making plans for carrying out an improvement program. Employment will be given to about 75,000 men.

Of the $45,000,000 available, $24,000,000 will be derived from the sales tax on gasoline, $4,000,000 from motor vehicle registration fees, $6,500,000 from federal aid and the remainder from county bond issues.

Personal Notes

C. A. Harrell, who has been city manager of Portsmouth, Ohio, for the past two years, has resigned to become city manager of Binghamton, N. Y.

Hovis D. Palmore, chief engineer of the Kentucky state highway commission, has been appointed city manager of Covington, Ky., to succeed O. A. Kratz, who has held the office for the past eighteen months.

Grant Cook has been appointed engineering commissioner of Youngstown, Ohio. Mr. Cook has been with the Truscon Steel Co., in which company he has won steady promotion from draftsman to chief engineer. For the past three years he has been sales manager of the reinforcing department.

Chester E. Albright, announces the dissolution of Albright & Mebus, Philadelphia, and the organization of Albright & Friel, Inc., to practice general consulting engineering, specializing in municipal work, including water supply and sewage disposal. Mr. Albright is president and Francis S. Friel is vice-president and treasurer.

Albert H. Myers, who was for several years executive engineer for the Wellman Engineering Co., Cleveland, Ohio, and for the past five years district representative for Stone & Webster, Inc., in the Milwaukee district, announces the establishment of a literature research service to architects, engineers and patent attorneys, as well as to industries which they may represent. His headquarters will be in Milwaukee.

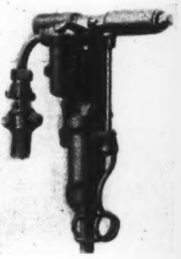
Obituary

George E. Ellis, secretary of the joint committee on automatic train control, American Railway Association, and formerly a railway signal engineer, died at Washington, D. C., Dec. 17. He was a member of the American Society of Civil Engineers, the American Railway Engineering Association and the signal section of the American Railway Association.

Construction Equipment and Materials

Lightweight Rock Drill

Using ⅞-in. standard steel in lengths up to 8 ft., the new class L-1 lightweight rock drill announced by Sullivan Machinery Co., 400 North Michigan Ave., Chicago, Ill., weighs only 30 lb. and is only 17 in. long. It may be equipped with either T handle or single grip handle, as required by conditions. Design and construction follow, in general, the pattern of larger Sullivan rock drills.



30-lb. rock drill

In the medium weight field, this company has also announced improvements in its class L-6 drills, weighing 64 lb. and capable of drilling from 12 to 25 ft. with 1-in. steel. This machine is now equipped with the cam-type front head, in which a cam and locking bar are employed for retaining the steel in the chuck. This device is simple, rugged and easy to lock or release. Models are available in hollow piston, air tube and watertube types for various conditions of service.

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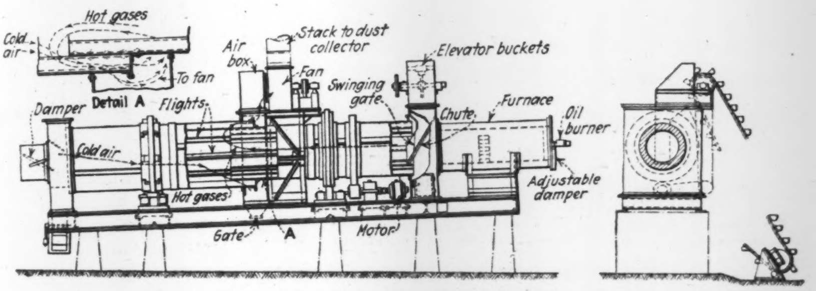
Rotary Drier and Cooler for Cold-Mix Aggregates

In the cold mixing of bituminous paving products, it is necessary to heat the aggregates sufficiently to eliminate moisture and then to cool them to the permissible working temperature, which usually does not exceed 115 deg. To facilitate this operation the Asphalt Equipment Co., Scottdale, Pa., has announced the Universal internally fired rotary drier, in which hot gases pass over and through the aggregate to be discharged, together with the absorbed moisture, through a main air box. At the same time cold outside air, introduced at the opposite end of the tube, counterflows through the dried aggregate, cooling it to the required temperature. Correct proportioning of the hot gases and cold air through adjustable dampers gives accurate temperature control.

The construction of the drier is shown in the drawing. It consists of a drum shell of high-grade boiler plates, butt strap riveted and heavily reinforced, equipped with special lifting flights to distribute the aggregate over a maximum area and with tires of the seamless forged steel locomotive type. The trunnions on which the drum revolves are of alloy steel, with dustproof radial and thrust bearings running on alloy steel oversize shafts. The drum is revolved by a motor driving through a fully inclosed speed reducer fitted with dustproof roller bearings and flexible couplings. This unit also drives the cold material elevator. A separate motor is connected with the large fan through a short multiple V-belt drive. The complete outfit is mounted on a rigid structural frame and is within limit dimensions for railroad loading. Smaller sizes are suitable for truck loading. For convenience in transportation, the furnace and fan are separate units. This drier is made in four sizes, with capacities of 20, 30, 40 and 50 tons per hour. Driving motors vary from 20 to 40 hp. and fan motors from 10 to 20 hp.



Rotary drier and cooler for stone and sand aggregates

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Starting Large A.C. Motors

A new part-winding starting method for alternating-current motors developed by the Electric Machinery Mfg. Co., Minneapolis, Minn., is particularly adaptable to large pump installations. In the part-winding method of starting motors, the stator is wound with two or more parallel circuits, one of these being connected to the full line voltage at standstill, the other or others to the line at a later time during the starting period. This starting method has several advantages in simplifying control equipment and in providing smoother starting with less line disturbance.

New Medium-Weight Tractor

Closely following the announcement of the Caterpillar 50 tractor (*ENR*, Oct. 22, p. 673), the Caterpillar Tractor Co., Peoria, Ill., has brought out another new size known as the 35, which develops 37 maximum drawbar horsepower, 41 maximum belt horsepower, and is powered with a four-cylinder water-cooled gasoline motor with a bore of 4⅞ in. and a stroke of 6½ in. In general design and appearance the new 35 closely resembles the larger model 50. Deliveries are expected to start early next spring.

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Post for Reflector Sign

A new type of post for mounting button-type reflector signs is being marketed by the Toledo Pressed Steel Co., Toledo, Ohio. The post is 7 ft. long, formed from 13-gage steel channel section with a pressed stiffening rib. The bottom end is formed for driving into the ground or may be set in concrete. Heavy steel U-clips, welded to the post at the standard spacing, receive bolts passing through the sign, the post and the clip. The points of each clip project beyond the plane of the channel a sufficient distance to give clearance to the button box containing the reflecting unit. Thus the sign has two-point contact, is rigidly attached and suffers no distortion. The assembled sign cannot be twisted in the ground, is strong enough to resist being bent permanently, but has a degree of resilience sufficient to withstand a severe blow without injury to sign or post.

Steel sign post

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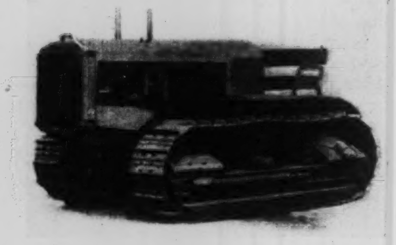
Welding Electrode for Reclaiming Manganese Steel

Steel castings containing from 11 to 14 per cent manganese, used for bucket teeth, bucket lips, screen plates, crusher jaws, sprockets and sheaves, have long been difficult to reclaim with the electric arc because the temperature of the arc is detrimental to the heat treatment of the casting. After long research, however, the Stulz-Sickles Co., 134 Lafayette St., Newark, N. J., has developed the Seaco Manganal 11 to 13½ per cent manganese steel electrode, which will rebuild and reclaim such parts by the electric arc welding process without affecting the heat treatment of the parent metal. These rods can also be used for laying a layer of manganese steel on soft steel and high-carbon steel parts.

Larger Tractor Announced

As a companion to its well known 35 tractor, the Allis-Chalmers Mfg. Co., Milwaukee, Wis., is now building the new model L, a six-cylinder track-type tractor that will handle the largest elevating grader as well as heavy snow plows. Design features include force feed lubrication; oil, air and fuel filters; removable cylinder sleeves; and a six-speed transmission giving a maximum traveling rate of 6½ m.p.h.


Heavy six-cylinder tractor

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Graphited Babbitt Metal

Grapho babbitt metal, a mixture of graphite and bearing metal that does not separate during pouring and handles like ordinary babbitt, is now being produced by the Lehigh Babbitt Co., Allentown, Pa. Its principal advantage is the reduced bearing temperature, friction load and oil consumption. The bearing surface and the face of the journal receive a high polish because of the fine distribution of the graphite, and the lubricating oil film is kept continuous under severe loads. The material can be applied to all types of bearings, including submerged journals.

New Publications

Steel Liner Plates—Engineering data pertaining to steel liner plates for permanent underground work such as railroad, sewer, water and mine tunnels, caissons, shafts and mine entries are presented in a 16-p. bulletin of the TRUSCON STEEL Co., Youngstown, Ohio.

Asphalt Plants—Facilities of the NEW YORK CENTRAL IRON WORKS Co., INC., Hagerstown, Md., for the fabrication of apparatus and machinery of every description, with particular emphasis upon asphalt plants, are described in a new catalog recently issued.

Welding — Plate 29 in the series on studies in structural arc welding prepared by the LINCOLN ELECTRIC Co., Cleveland, Ohio, deals with purlins in arc-welded mill buildings.

Corrosion-Resisting Alloys—"Combating Corrosion With Alloys," an article by Clayton E. Plummer and Richard K. Akin that appeared in *Railway Purchases and Stores*, has been reprinted by the ROBERT W. HUNT Co., 2200 Insurance Exchange, Chicago, Ill.

Truck Mixer Bodies—BLAW-KNOX Co., Pittsburgh, Pa., in bulletin 1306-A gives specifications and a detailed description of the Blaw-Knox Trukmixer in sizes from 1 to 5 cu.yd. capacity.

Centrifugal Pumps—Recent publications of the PENNSYLVANIA PUMP & COMPRESSOR Co., Easton, Pa., include bulletin 216, covering sleeve and ball-bearing multi-stage centrifugal pumps, and bulletin 217, on single-stage centrifugal pumps.

Rail Steel — Illustrated information on the methods used in reclaiming rail steel is given in a 48-p. booklet prepared by the REPUBLIC STEEL CORP., Youngstown, Ohio. Product forms, including structural shapes, fence posts, and tubing, are shown in cross-section, together with weights and information on extras.

Valves—The Lubrotite gate valve, described in *ENR*, Nov. 5, p. 747, is the subject of a 16-p. booklet by the READING-PRATT & CADY Co., Bridgeport, Conn. This valve differs from the ordinary gate valve in that it has a duct system for introducing a lubricant-seal between the seating surfaces.

Metal Buildings — TRUSCON STEEL Co., Youngstown, Ohio, has issued a 16-p. supplement to its standard building catalog to describe Ferroclad walls.

Welding Equipment—BASTIAN-BLESSING Co., 240 East Ontario St., Chicago, Ill., has compiled a new catalog 57 giving specifications and prices of all types of welding and cutting torches, regulators, gas economizers, acetylene generators and accessories. Many helpful hints on the choice of equipment are included. The booklet contains 40 pp., is illustrated and is of convenient size for carrying in the pocket.

Wrought Iron—Characteristics and applications of wrought iron are given in great detail in a 50-p. illustrated booklet published by the WROUGHT IRON RESEARCH ASSN., 1111 Union Bank Building, Pittsburgh, Pa.

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Business Notes

CLEAVER-BROOKS Co., Milwaukee, Wis., has been organized to manufacture and market equipment for heating bituminous materials, aggregates and water for central mixing plants, for central proportioning plants on large construction work where winter mixing of concrete is carried on, and for furnishing hot water to industrial plants. J. C. Cleaver is president and R. E. Brooks is secretary-treasurer.

K. B. NOBLE Co., Hartford, Conn., has been appointed exclusive distributor in the state of Connecticut and the western section of Massachusetts for the Lidgerwood Mfg. Co., Elizabeth, N. J., and the Galion Iron Works, Galion, Ohio.

LINCOLN ELECTRIC Co., Cleveland, Ohio, has established branch offices in Scranton and Allentown, Pa., in charge of D. Levenson and F. Shackleton, respectively. The New York City office has been moved to the new McGraw-Hill Building at 330 West 42d St.

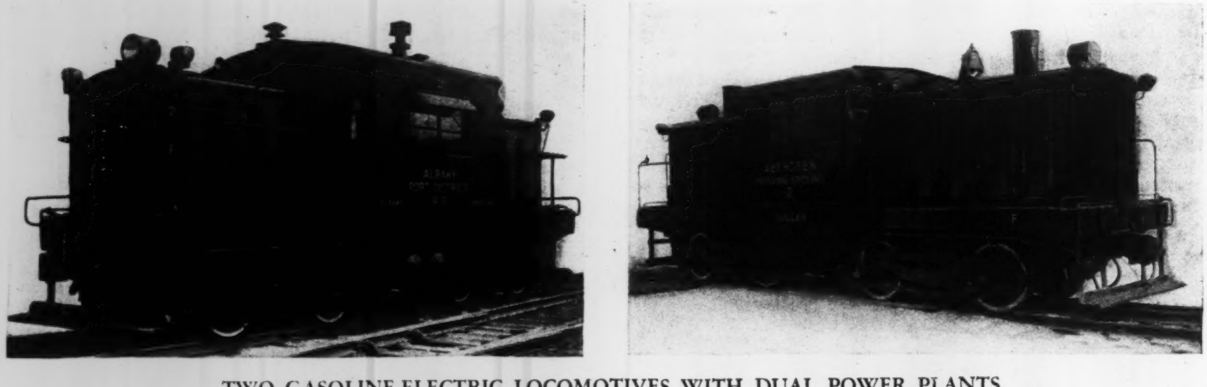
CONSOLIDATED EXPANDED METAL COMPANIES, Wheeling, W. Va., has appointed Paul R. Clark manager of its New York branch, to succeed George Barnes, resigned.

ARCO Co., Cleveland, Ohio, announces the appointment of Philip L. Maury as president and the resignation of S. D. Wise, former president, and S. D. Weil, former vice-president.

GENERAL ELECTRIC Co., Schenectady, N. Y., announces the appointment of John Anderson as secretary of the sales committee.

CONTINENTAL MOTORS CORP., has appointed Ray A. Long assistant general sales manager.

NORWOOD ENGINEERING Co., Florence, Mass., has placed W. C. Hanson in charge of sales in the New York metropolitan district. Mr. Hanson will continue as export manager.


TWO GASOLINE-ELECTRIC LOCOMOTIVES WITH DUAL POWER PLANTS

Recent practice in the construction of heavy-duty industrial locomotives is exemplified in the two units here illustrated, both of which are designed for switching service with widely varying loads. At the left is a 48-ton locomotive built by the Midwest Locomotive Works, Hamilton, Ohio, for the Albany (N. Y.) Port District Railroad. Each of two Climax six-cylinder gasoline motors developing 165 hp. at 1,200 r.p.m. is coupled to a 500-volt General Electric d.c. generator. Final drive is through four 75-hp. G. E. traction motors and reduction gearing to the axles. The locomotive on the right, of similar construction, was built by the Vulcan Locomotive Works, Wilkes-Barre, Pa., for service at the Aberdeen Proving Grounds, Md. It weighs 50 tons and is equipped with 175-hp. eight-cylinder LeRoi gasoline motors, 500-volt G. E. generators and 112-hp. G. E. traction motors. Both units are equipped with Timken roller bearings, Westinghouse air brakes, electric starting and lighting and hot water cab heaters. For light haulage, either can be operated by a single motor, while the second motor can be cut in when needed without stopping the locomotive.

CONSTRUCTION NEWS

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Some of the Week's Large Projects

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Location	*Project*	*Cost*	*Status*
Waterworks			
San Diego (Calif.)	Dam	$4,290,000	Proposed
Bridges			
Wisconsin	Bridges	2,355,000	Proposed
Saskatoon (Sask.)	Bridge	850,000	Contract
Streets and Roads			
Virginia	Roads and bridges	12,432,040	Proposed
Subways and Terminals			
New York	Subway	9,500,000	Proposed
Federal Government			
Pittsburgh	Post office—superstructure	4,596,000	Contract
Power Plants			
Piqua (O.)	Power plant	810,000	Bids asked
Sports and Parks			
Montreal (Que.)	Amphitheatre	3,000,000	Proposed

WATERWORKS

PROPOSED WORK

Calif., San Diego — Voted transferring $4,290,000 funds hitherto authorized for various water projects, but not used, for constructing hydraulic rock filled dam in San Diego River at El Capitan. H. N. Savage, Ctiy Hall, engr. Noted Nov. 19.

Calif., Signal Hill—City Council, G. H. Cooper, city clk., will not take bids Dec. 28, 4 mi. 20 in. water pipe line. Will revise plans and readvertise for bids. Currie Eng. Co., Anderson Bldg., San Bernardino, engrs. Noted Nov. 19.

Okla., Hobart—City Council rejected bids new water supply, earthen dam, pipe line, pump station. W. R. Holway, 302 East 18th St., Tulsa, engr. Noted Dec. 10.

Okla., Ponca City—Indian Hills, Resort Co., C. McDonald, pres., new earthen dam, 300,000 cu.yd. earth excav., near here $20,000. J. W. Atherton, Ponca City, engr.

CONTRACTS AWARDED

N. Y., Peekskill—Bd. Water Comrs., 3 m.g. additional pure water covered reservior, to W. W. Hoyt Constr. Corp., Peekskill, $55,076. Noted Nov. 5.

N. Y., Poughkeepsie—Bd. Water Comrs., 17,500 lin.ft. 8 in. bell and spigot pipe, to W. G. Fritz Co., Inc., 69 Main St., West Orange, N. J., $40,992. Est. $63,000. Noted Nov. 26.

Okla., Hobart—City, c/o Mayor, earth and concrete dam, c.i. pipe, to Sherman Machine & Iron Wks., 18 East Main St., Oklahoma City, $170,000. Est. $250,000.

Alta., Calgary—City, 140 ft. elevated steel tank, 500,000 gal. capacity, to Dominion Bridge Co. Ltd., Calgary, $60,000.

SEWERS

PROPOSED WORK

Ill., Harrisburg—Sanitary sewerage system, also sewage disposal plant. Russel & Axon, 6200 Easton Ave., St. Louis, Mo., engrs.

Ind., Tipton—City Council sewage disposal plant. $200,000. Address City Clerk.

Md., Baltimore—Bd. Awards, rejected bids Dec. 9, superstructure, 1 story, 53 x 92 ft., brick, stone, granite, architectural terra cotta trim mechanical screen building, Back River.

O., Shelby—Soon takes bids disposal plant, plain settling tank, separate sludge digestion, two 1 m.g.d. centrifugal pumps; plans next spring construction 15,800 ft. trunk sewer, $218,000. $150,000 voted for same. F. Browne, Marion, sanitary engr. Noted Dec. 17.

BIDS ASKED

Ill., Chicago Jan. 21, by J. J. Sullivan, clk. Sanitary Dist. of Chicago, 910 South Michigan Ave., West Side Sewage Treatment Works, Div. DD; adv. E. N.-R. Dec. 31.

N. Y., Brooklyn—Jan. 4, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Caton Ave. and Burnett St.

N. Y., New York—Jan. 4, by S. Levy, pres. Manhattan Boro, Municipal Bldg., sewers in 49th St., 10th Ave. to Hudson River, across 12th Ave. and Marginal St., at 47th and 48th Sts.; sanitary sewer on east side 12th Ave., from 49th to 47th Sts., and temporary sanitary by-pass in 12th Ave. from 47th to 46th Sts., in connection with west side improvement New York Central R.R.

S. D., Sioux Falls—See "Contracts Awarded."

CONTRACTS AWARDED

La., New Orleans—See "Streets and Roads."

Mass., Arlington—Metropolitan Dist. Comn., 20 Somerset St., Boston Sect. 82, Mill Brook Valley Sewer, North Metropolitan System, to N. Cibotte, 46 Water St., Hyde Park, $8,080.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Mansfield Pl., to R. Nazzarro, Inc., 7101 11th Ave., $4,535; in Horace Ct., to J. Alfornie, 77 Stillman St., $1,055. Noted Dec. 3.

S. D., Sioux Falls—City, storm sewer, day labor, under supervision city engineers. $150,000. Work under way. Noted Oct. 29.

Tex., Dallas—City, c/o E. Goforth, secy., constructing sanitary sewer main in Broadmoor, Freemont addition from Cedar Creek to Brownlee St., through Beckley Club addition and Trinity Heights Addition No. 1, city forces, $25,000; storm sewer Mill Creek Diversion to Turtle Creek, running from outlet into Turtle Creek, just south of Blackburn St., and to intake Lot 12 of the Cole tract, to McKenzie Constr. Co., Construction Bldg., $92,734; storm sewer Dallas Branch, via McKinney Ave., open cut sect. running from sect. with the present 12 in. sewer in River Bottom at Station 31+Sta. 25, just west of Missouri, Kansas & Texas Ry. Co. tracks and incl. connection with present Pacific Ave. storm sewer running from Sta 0 + 16.5 to Sta. 6+64.9, to W. B. Carter, 7 North Rockford St., Tulsa, Okla., and W. G. Humphreys, 510 Securities Bldg., Omaha, Neb., $96,795; Dallas Branch storm sewer, via McKinney Ave. Tunnel Sect. running from Sta. 31+25, just west of Missouri, Kansas & Texas Ry. tracks to Sta. 51 + 62 in Illing St., at Orange, to J. B. McCrary Co., Praetorian Bldg., $70,759. Grand total $285,288. Noted July 23.

Ont., Aurora—Town Council, sewers to W. E. Taylor & Co., Ltd., 22 Falcon St., Toronto, $65,000.

BRIDGES

PROPOSED WORK

Minn., Baudette—Walter Butler Co., V. W. O'Connor (owner and contractor), 630 Hamm Bldg., St. Paul, will build 1,155 ft. steel bridge, across Rainy River to Canadian side. Congressional warrant to be sought.

Mo., Kansas City—Preliminary plans Walnut Street Viaduct over Terminal R.R. tracks at Walnut St. $300,000. Ash, Howard, Needles & Tammen, 1012 Baltimore Ave., engrs.

Tex., El Paso—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

Wisconsin—State Hy. Comn., Madison River on Hy. 130, Lone Rock Flood Bridge over Wisconsin River, Iowa, Rich and Sauk Counties $100,000—Chippewa Bridge over Chippewa River on Hy. 35, Buffalo and Pepin Counties, $1,000,000 Flood; Flambeau River Bridge 1, over Flambeau River, on Hy. 8, Ladysmith, Rusk Co., $125,000—Chippewa Falls Bridge, over Chippewa River and railroad tracks on Hys. 29 and 53, Chippewa Falls, Chippewa Co., $400,000—Indian Ford Bridge, over Rock River, Hy. 51, Fulton Rock Co., $230,000—De Pere Bridge, over Fox River, on Hy. 41, on U. S. Govt. Canal, DePere, Brown Co., $500,000.

Virginia—See "Streets and Roads."

Ont., Ottawa—J. Gamble, clk., Billings Bridge, bids early in 1932, tile, stone or timber drains, near here, for Nepean Twp. $50,000. R. E. Nelson, Billings Bridge, Reeve.

BIDS ASKED

Okla., Yukon—See "Contracts Awarded."

Wisconsin—Jan. 5, by State Hy. Comn. and Coms. Buffalo, Jackson, and Monroe Counties, Batavian Natl. Bank Bldg., LaCrosse. Femien Bridge, F.A.P. 465-A, S.T. Hy. 35, Buffalo Co.—bridges, culverts on Black River Falls-Millston Rd., F.A.P. 214, Jackson Co.—Tomah-Milston Rd., F.A.P. 396-A, Monroe Co.

CONTRACTS AWARDED

Calif., Long Beach—City Council, 1,320 ft. concrete, steel grade separation, L shaped, crossing 4 tracks Pacific Electric R.R., Orange Ave. approach to have 50 ft. roadway, two 6 ft. sidewalks, Hill Street approach to have 36 ft. roadway, two 6 ft. sidewalks, incl. rein.-con. retaining walls, concrete pedestal, 3,700 cu.yd. concrete also 250 tons structural steel, for cities of Long Beach and Signal Hill, Los Angeles Co. and Pacific Electric Ry. Co., to G. E. Bartlett, 2132 Chestnut Ave., $76,945, steel contract, to Consolidated Steel Corp., 1200 North Main St., Los Angeles, $16,900. Noted Aug. 27.

Florida—State Roads Comn., Tallahassee, B. M. Duncan, state hy. engr., 2 concrete steel, timber bridges, Project 875-B, Sumter and Hernando Counties, to C. T. Felix, St. Petersburg, $24,479.

Georgia—State Hy. Bd., East Point, bridge at Burney Station, Meriwether Co. to H. W. Henderson, Cartersville, $6,684 — bridge over Broad River, Madison Co., to Wannamaker & Wells, Orangeburg, S. C., $17,316—5 bridges in Colquitt Co., to W. F. Scott, Thomasville, $20,394—concrete bridge over Little Harrison Creek, at Survey Station, to Goodwin & Hurt, Montgomery, Ala., $14,715—bridge over Cedar Creek, Taylor Co., and 2 bridges in Henry Co., to D. B. Scott & Co., Decatur, $7,241 and $17,275 respectively. Grand total $83,685.

Ill., Chicago—Jan. 6, by Bd. Comrs. Lincoln Park, Clark and Center Sts., superstructure single-leaf trunnion bascule bridge over Michigan Canal, superstructure of north approach between south line of North Pier Terminal Building and Michigan Canal; structural steel work only for superstructure, North Viaduct, Bents 12 to 13 (inclusive) all being part Outer Dr. Improvement. B. Nettelhorst, secy.

Iowa—Jan. 5, by State Hy. Comn., Ames, 50 x 24 ft. I-beam span, 40 concrete box culverts, extensions F.A.B. 98 and 284 Winneshiek Co.—raising, widening 16 x 18 ft. concrete slab bridge, also 10 concrete box culverts, extensions, F.A.B. 99, Kossuth Co.—11 concrete culverts, extensions, B-685, Allamakee Co. B. Johnson, chn.

Me., Carmel—State and Maine Central R.R. A. H. Morrill, Portland, ch. engr., rebuilding steel superstructure bridge, to McClintick-Marshall Corp., 68 Devonshire St., Boston, Mass. Noted Dec. 10.

Maryland—Jan. 12, by State Roads Comn., G. C. Uhl, chn., Baltimore, installing 2 safety gates for bridge over Cambridge Creek at Cambridge, Contr. D-85-17, Dorchester Co.; adv. E. N.-R. Dec. 31.

See proposal advertising on page 43

LEADITE

Trade Mark Registered U.S. Pat. Office

Enduring

Joints on Bell & Spigot Water Mains MUST BE "ENDURING,"—for a Water Main is usually buried beneath the Earth's surface to be forgotten. Therefore, not only must the pipe itself be long lived and dependable,—but the joints must also be Tight, Dependable and Long Lived.

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Bridges (Continued)

Ohio—O. W. Merrell, dir. hys., Columbus, 25 ft. span concrete slab bridge, 24 ft. roadway, Sect. "B" West Union-Portsmouth Rd., Adams Co., to Lewis & McCoy, Jackson, $11,377—22 ft. span concrete slab bridge, 24 ft. roadway, approaches over Wagner Run, and 14 ft. span concrete slab bridge over Powell Creek, 24 ft. roadway, Sect. "L" Ottawa-Defiance Rd., Defiance Co., to D. and E. Constr. Co., Defiance, $9,780—one 13 ft. and two 32.58 ft. span concrete slab bridge over Sugar Creek, two 3 ft. sidewalks, Sect. "Jeffersonville" Springfield-Washington C. H. Rd., Fayette Co., to Clarke Bros. & Co., Inc., Mayesville, Ky., $15,355—continuous concrete slab bridge, incl. one 25 ft. center span, two 20 ft. end spans over Scioto River, 29 ft. roadway, approaches, Sect. "E" Lima-Bellfontaine Rd., Hardin Co. and two 45 ft. span concrete beam bridge over Whetstone Creek, 30 ft. roadway, two 4.6 ft. sidewalks, approaches, Sect. "Mt. Gilead" Delaware-Mt. Gilead Rd., Morrow Co., to Greene & Sawyer, Lima Trust Bldg., Lima, $12,946 and $19,793 respectively—40 ft. span concrete beam bridge over Peters Creek, 34 ft. roadway, approaches, and 60 ft. span rein.-con. beam bridge over Salt Creek, 34 ft. roadway, approaches, Sects. "H" and "K" National Rd., Guernsey Co., to E. L. Paul, Zanesville, $47,319—two 20 ft. span concrete beam bridge over Sand Run, 24 ft. roadway, approaches, Sect. "Wellston" McArthur-Jackson Rd., Jackson Co., to E. D. Blanchard, Wellston, $8,211—55 ft. span, concrete beam bridge over Reynolds Creek, 24 ft. roadway, approaches, Sect. "D" Columbus-Millersburg Rd., Licking Co., to J. R. Board, Alexandria, $14,161—50 ft. span concrete beam bridge, 24 ft. roadway, approaches over Hog Run, Sect. "C" Newark-New Lexington Rd., Licking Co., to B. C. Patterson, Vanatta, $16,015—two 35 ft. span concrete beam bridge, over Chickasaw Creek, 24 ft. roadway, approaches, Sect. "B" St. Marys-Coldwater Rd., Mercer Co., to John Frantz & Son, Sidney, $9,863—42 ft. span concrete beam bridge, 45.33 ft. roadway, two 6 ft. sidewalks, approaches over Little Cuyahoga River, Sect. "Akron" Akron-Kent Rd., Summit Co., to T. E. McShaffrey Constr. Co., 171 South Forge St., Akron, $15,573—47 ft. span creosoted timber bridge, with steel stringers, 27 ft. roadway over Collins Creek, Sect. "A" McConnelsville-Cambridge Rd., Guernsey Co., and 50 ft. span creosoted timber bridge, steel stringers, 24 ft. roadway, approaches, and two 40 ft. span, creosoted timber bridge, 29 ft. roadway both over Wheelbarrow Creek, Sect. "A" Prattsville-Zaleski Rd., Vinton Co., to Dodge-Hussey Inc., 1174 West 5th Ave., Columbus, $8,912 and $11,061 respectively—three 30 ft. span creosoted timber bridge, steel stringers over Sugar Creek, 24 ft. roadway, approaches, Sect. "E-2" Navarra-Berlin Rd., Stark Co., to Rohe Constr. Co., Canton, $12,429—grading, drainage, 2.914 mi. Sects. "H-1" and "H-2" Atwater Troy Rd., Portage Co., to Troyer Constr. Co., Aurora, $28,762. Grand total $241,557. Noted Dec. 10.

Oklahoma—State Hy. Dpt., Oklahoma City, 4 span 232 ft. concrete truss bridge on concrete piers, incl. 27.87 tons reinforcing steel, 1,056 ft. wooden piling, at Coalgate, Coal Co., to Ledford & Way, Walters, $23,315; est., $27,000—3 span 160 ft. truss bridge on concrete piers, 23.24 tons reinforcing steel, at Welch, Craig Co., to Boardman & Co., Maple and Hawk Sts., Oklahoma City, $23,202; est., $27,000—3 span 90 ft. concrete I-beam bridge on concrete piers, 13.60 tons reinforcing steel, 2,870 ft. wooden piling, at Stillwater, Payne Co., to Schlicter Bridge Co., Clay Center, Kan., $21,485; est., $25,000—3 span 246 ft. steel truss and I-beam bridge, 22.42 tons reinforcing steel, near Pontotoc, Johnson Co., to J. N. Ables, Modill, $42,275; est., $50,000—3 span 170 ft. steel truss and I-beam bridge, 40.54 tons reinforcing, and 2 span 280 ft. steel truss bridge on concrete piers, 40.08 tons reinforcing, both at Hodgens, LeFlore Co., to J. N. Keliher, Little Rock, Ark., $26,402 and $39,614 respectively ests. $30,000 and $40,000 respectively. Grand total $172,295. Noted Sept. 24 and Dec. 10.

Okla., Yukon—Oklahoma Ry. Co., Terminal Bldg., G. B. Treat, ch. engr., 14 span 240 ft. pile trestle overflow bridge, Canadian Co., own forces. $25,000.

Sask., Saskatoon—G. D. Archibald, city engr., general contract erection bridge over Saskatchewan River, from 4th Ave. to Broadway, to R. J. Arrand Constr. Co., Ltd., 861 First Ave. N., $261,900; furnishing 825 tons reinforcing steel bars, to Manitoba Rolling Mill Co., Ltd., 875 Logan Ave., Winnipeg, Man., at $3.07 per hundredweight; supplying 30,000 bbls. cement, to Canada Cement Co., Canada Cement Bldg., Montreal, Que., Sullivan Supply Co., Ltd., Manitoba and 26th Sts., Saskatoon Mackenzie & Thayer Ltd., 24th St. and Ontario Ave., and Marlborough Cement Co. Total est., $850,000. Noted Dec. 10.

STREETS AND ROADS

BIDS ASKED

Iowa—Jan. 5, by State Hy. Comn., Ames **(F.A.P. means Federal Aid Project)** grading, drainage structures, paving 2.917 mi. Rd. 9, F.A.P. 197-A, Allamakee Co.—13.772 mi. Rd. 7, F.A.P. 330, Dallas Co.—6.19 mi. Rd. 9, F.A.P. 66-B, Kossuth Co.—4.618 mi. Rd. 9, F.A.P. 98-D—1.587 mi. Rd. 9, F.A.P. 98-E—4.043 mi. Rd. 9, F.A.P. 284-D, all Winneshiek Co.—grading, drainage structures 8.525 mi. F.A.P. 51-C, Guthrie Co. B. Johnson, chn.

Kentucky—Jan. 12, by State Hy. Dpt., Frankfort, widening, block top surfacing Covington-Erlanger Rd., U. S. Rd. 25, Kenton Co. $200,000. H. D. Palmore, Frankfort, ch. engr.

Mo., Clayton—St. Louis Co., Court House, soon takes bids rein.-con. paving 1,500 ft. Hildesheim Ave. Grading and drainage by hand labor. R. Jablonsky, co. engr.

Tex., Dimmitt—Jan. 11, by City, c/o W. F. Lampe, Dimmitt, asphalt on caliche base paving 6 blocks streets, 51 ft. F. Easter, Dimmitt, engr.

Tex., El Paso—See "Streets and Roads."

Virginia—State Hy. Comn., Richmond, H. G. Shirley, chn., plans expending $12,432,040 during 1932, improving and constructing roads and bridges in 8 districts.

CONTRACTS AWARDED

Georgia—State Hy. Bd., East Point, to A. H. Singer, Lafayette, Ala., top-soil surfacing 6.177 mi. road Madison Co. $40,961; 4.936 mi. Madison Co. $11,771—to Hooper Constr. Co., Bunnell, Fla., pebble soil surfacing 11.593 mi. Colquitt Co. $71,159—to Barber Bros. Constr. Co., Baton Rouge, La., hard-surfacing 6.344 mi., incl. 1 bridge and 2 culverts, Screven Co., $97,782—to Davis Constr. Co., Jacksonville, 12.877 mi. Washington and Jefferson Counties $189,494—to Duval Eng. & Constr. Co., Jacksonville, Fla., 3.476 mi. Ware Co., $64,062—to Campbell Contg. Co., Columbus, paving in city of Hawksville, Pulaski Co. $10,081—to J. W. Gwinn Constr. Co., Birmingham, Ala., concrete surfacing 11.743 mi. Washington Co. $180,024—to San E. Finley, Atlanta, 4.977 mi. Jeff Davis Co. $53,758; sand asphalt surfacing 0.897 mi. Seminole Co. $27,389, resurfacing 1.5 mi. Stewart Ave. in Atlanta, Fulton Co., $14,619—to Wannamaker & Wells, Orangeburg, S. C., concrete surfacing 0.42 mi. Richmond Co. incl. steel, concrete bridge over Savannah River, at Sand Bar Ferry, $73,062—to Whitley Constr. Co., La Grange, 0.853 mi. Pulaski Co. $18,405, 7.093 mi. Stewart Co. $123,119—to Van Gordon Constr. Co., Jacksonville, Fla., 4.862 mi. Colquitt Co. $78,185; 4.669 mi. Stewart Co. $80,232; 13.368 mi. Grady and Thomas Counties $243,032—to Beckham-Lowler Constr. Co., Perry, grading, drainage structures 3.593 mi. Peach Co. $21,977; 6.385 mi. Baldwin Co. $24,591—to Canton-Haverston & Hageman, Asheville, N. C., 3.848 mi. Cherokee Co. $41,341—to Phelps & Milan, Decatur, 1.079 mi. Wilkes and McDuffie Counties $18,201—to M. R. Woodell & Co., Inc., Atlanta, 3.848 mi. Cherokee Co. $34,034—to O. M. Lyle Constr. Co., Gainesville, constructing 8.6 mi. Evans Co. $53,482—to Southern Clay Mfg. Co., Provident Bldg., Chattanooga, Tenn., material for paving streets in Newman, Coweta Co. $20,290. Grand total $1,591,051. Noted Nov. 12.

Ill., Tessville—Paving Touhy Ave., to Arcole Constr. Co., Niles Center, $74,112.

Kansas—State Hy. Comn., Court House, Stockton, to W. M. Watson, Topeka, sand gravel surfacing 16.52 mi. road in Graham Co. $6,443—to San Ore Constr. Co., McPherson, 14.662 mi. Sheridan Co. $5,015—to D. H. Hanson, Logan, 13.038 mi. Phillips Co. $10,524, 10.029 mi. Norton Co., $8,455—to D. H. Hardeman, Alton, limestone gravel surfacing 17.257 mi. Federal Aid Project C, Rooks Co. $32,723, 6.348 mi. same road, Sect. D $9,236, 4.409 mi. Graham Co. $8,400. Grand total $80,796. Noted Nov. 19.

Kansas—State Hy. Comn., Court House, El Dorado, to E. Graff, Newton, light type surfacing 5 mi. K4-K.P. 1280 $1,838, 1.996 mi. K4-K.P. 1281 $734; 1.503 mi. K4-K.P. 1279 $564, all Barton Co.—to Miller & Furman, El Dorado, 18,066 mi. Butler Co. $9,106—to Cook & Cone, Ottawa, 11.953 mi. Comanche Co. $3,945; 18.344 mi. Cowley Co. $6,618—to Roberts Constr. Co., Orpheum Bldg., Wichita, 7.233 mi. Butler Co., $3,515. Grand total $26,320. Noted Nov. 19.

La., New Orleans—City Council, to L. M. Buja, 1431 Leda St., stone curbing, vitri. brick paving 332 ft. Conti St. from North Peters St. to Dock Board Rd. $8,790; sidewalks on Solomon St. $1,630—to Uvalde Rock Asphalt Co., 3905 Gravier St., concrete curbing, concrete and limestone rock wearing surface paving 1,579 ft. Fairmont Dr. from Montpelier St. to Gentilly Rd. $21,660, concrete limestone wearing surface paving 1,989 ft. Reynes St. from Chartres St. to St. Claude Ave. $18,020, 2,374 ft. North Robertson St. from Laffite to Esplanade Aves., $28,700, 6,720 ft. St. Roch Ave., from Gentilly Rd. to Dreux Ave. $83,530—to Craven & Lang, New Orleans Bank Bldg., concrete with bituminous concrete wearing surface paving 1,159 ft. Solomon St., from Baudin St. to Tulane Ave., $13,590, 686 ft. Saratoga St. from St. Louis to St. Peters Sts., $9,810; 3,270 ft. Music St., from Gentilly Rd. to Dreux Ave., $36,240; 1,898 ft. Lizardi St. from Chartres St. to St. Claude Ave. $20,930, concrete, bituminous concrete and fine aggregate wearing surface paving 3,265 ft. Painters St. from Gentilly Rd. to Dreux Ave., $36,710, concrete curbing, concrete, bituminous concrete, fine aggregate wearing surface paving 3,248 ft. Arts St. from Gentilly Rd. to Dreux Ave., $36,450; curbing, concrete, oil asphalt paving 1,258 ft. Henry Clay Ave., from Perrier to Hurst Sts., $12,200; 889 ft. Henry Clay Ave., from Hurst St. to St. Charles Ave., $10,770, 1,353 ft. Henry Clay Ave., from Magazine to Perrier Sts., $13,560, 4,446 ft. General Taylor St., from Clara St. to Broad Ave., $47,300; 1,608 ft. Dreux Ave., from St. Roch to Franklin Aves., $21,300; 693 ft. Broad Pl., from Lowerline St. to Bway., $16,430—to H. A. Forrest, 6319 Catina St., sidewalks on General Taylor St., $7,110—to Louisiana Constr. Co., New Orleans, installing sub-surface drainage systems, manholes, handholes, cleanouts 1,014 ft. Henry Clay Ave., from Magazine to Coliseum Sts. $4,370; 1,898 ft. Raynes St. from Chartres St. to St. Claude Ave., $10,560—to M. J. Flynn, New Orleans, 2,374 ft. North Robertson St., from Lafitte to Esplanade Aves., $5,230; 4,446 ft. General Taylor St. from Clara St. to Broad Ave., $22,960; 1,609 ft. Dreux Ave., from St. Roch to Franklin Aves., $9,580; 332 ft. Conti St., from North Peters St. to Dock Board Rd. $1,040; installing sidewalks on 13 streets, $52,960—to J. B. Mooney, 2,000 Alvar St., drainage systems, manholes, etc., 3,248 ft. Arts St., from Gentilly St. to Dreux Ave., $14,090; 693 ft. Broad Pl., from Lowerline St. to Bway. $1,800; 3,270 ft. Music St., from Gentilly Rd. to Dreux Ave., $14,600; 3,265 ft. Painters St., from Gentilly Rd. to Dreux Ave., $14,810; 6,720 ft. St. Roch Ave., from Gentilly Rd. to Dreux Ave., $15,050—to A. P. Boh & Co., 837 Perdido St., 1,580 ft. Fairmont Dr. from Montpelier St. to Gentilly Rd. $18,770; 1,229 ft. Henry Clay St., from Coliseum to Perrier Sts., and from Hurst to St. Charles Sts., $4,830; 1,898 ft. Lizard St., from Chartres St. to St. Claude Ave., $9,840; 1,160 ft. Solomon St. from Baudin St. to Tulane Ave., $5,080. Grand total $641,560. Rejected bids sub-surface drains, sidewalks, concrete and vitr. brick paving 358 ft. Bienville St., 651 ft. Apricot St., 300 ft. Arabella St. Noted Dec. 10.

Missouri—State Hy. Comn., Jefferson City, grading, paving 3 mi. State Hy. 66, St. Louis Co., 20 ft., to F. T. Odell, Hannibal, $135,674. Noted Nov. 26.

Mo., Clayton—See "Bids Asked."

New York—A. W. Brandt, comr. Hys., Albany, concrete reconstructing 2.17 mi. Rockland Co., to J. P. Burns, Dumont, N. J., $35,618; est., $52,477—9.53 mi. Suffolk Co., to Sillman & Godfrey Co., 133 Admiral St., Bridgeport, Conn., $164,271; est., $234,673. Noted Nov. 19.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, granite paving Bushwick Ave., to C.P.K. Co., Inc., 66 Wyoming St., $13,194—Gold St., to Guimont Contg. Co., 1218 Locust St., $4,381—asphalt paving East 18th St. and Mansfield Pl., to B. Turecamo, New Crospey Lane, $6,133 and $7,622 respectively—Gold St., to Guimont Contg. Co., 1218 Locust St., $4,381—Pine St., to D. J. McCoy Asphalt Paving Co., Avenue U and East 47th St., $1,489—East 31st and 70th Sts., to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., $3,425 and $1,562 respectively. Grand total $37,806. Noted Dec. 3.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, drainage, structures 6.382 mi. State Aid Project 327-A and 4.272 mi. same road Sect. C, Le Flore Co., to J. J. Harrison, Norman, $55,428 and $27,478 respectively est. $60,000 and $45,000 respectively; 7.754 mi. State Aid Project 194, Johnston Co., to B. N. Talliaferro, Modill, $15,481 est. $25,000. Grand total $98,387. Noted Dec. 10.

Tex., Brownsville—Cameron Co., c/o O. D. Dancy, aud., concrete paving 4.3 mi. Olmito North Rd., to R. W. Briggs & Co., Pharr, $32,441. Noted Dec. 3.

Tex., Dallas—For 2½ in. vertical fibre brick on 6 in. concrete paving Lamar St., from Gulf, Colorado and Santa Fe Ry. to Forrest Ave., to H. L. Canady & Co., Constr. Bldg., Dallas, $30,260. Est. $31,000

Tex., El Paso—El Paso Co., combination scenic drive and flood control project in McKelligon Canyon, own forces, $125,000 voted for same. J. W. Carter, Court House, engr.

Tex., Houston—For 2 in. warrenite bitulithic on 6 in. rein.-con. slab, asphalt on 6 in. slab or 7 in. rein.-con. paving Louisiana St., from Barry to Dallas Sts., to Gulf Bitulithic Co., 2820 Polk Ave., $91,702.

Wis., Milwaukee—Dpt. P. Wks., City Hall, to Czerwiniski Constr. Co., South 16th St. and West Morgan Ave., paving alley between North Bway. and North Milwaukee Sts., $925; North 18th St. $28,995; West Auer Ave. $8,680—to Gumz & Switalski, 2065 South 18th St., alley between South 1st and South 2nd Sts. $1,062; North 44th St. $1,127; North 54th St. $1,318—to Schwerm Bros., 3829 North Weil St., North 53rd St. $11,454. Grand total $53,561.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Kan., Salina—City enjoined by court order from proceeding with flood control project Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

Tex., El Paso—El Paso Co., preparing plans flood protection work by means of levees and drains in Lincoln Park Sect. of El Paso, $35,000 bonds voted for same; widening present pavement 36 ft. warrenite bitulithic paving 5.1 mi. Hy. 1, from Ascarate to West Ysleta, $180,000, $100 voted by county to secure additional right-of-way and to pay 1/3 of construction cost. State and Federal Aid appropriated $120,000 toward cost; preparing plans flood protection work, incl. levees, drains along arroyo leading into city of Fabens, $35,000 bonds voted for same. Some of work may be done by county forces. J. W. Carter, Court House, El Paso, engr.

CONTRACTS AWARDED

Tenn., Memphis—Memphis District Engineer, 8,000 cu.yd. earthwork on Birds Point-New Madrid floodway levee, to C. J. Fugate, East Prairie, Mo.

Tex., El Paso—See "Streets and Roads."

Bond Elections

Coming Bond Elections

Sewers — Washington, Mo., Jan. 5, $30,000. W. B. Rollins Co., Kansas City, engrs.

Bonds Voted

Filtration Plant Ext. and Sewage Disposal Plant—Durant, Okla. $40,000.

Acquiring Present Waterworks or Building New Slystem, 20 mi. pipe line from North Fork Santiani River, $2,500,000. Barr & Cunningham, Portland, engrs.

Light and Power Plant—Villisca, Ia. $150,000. E. E. Jenkins, City Clk.

Bonds Defeated

Mountain Water Supply for Sacramento Municipal Utility Dist.—Sacramento, Calif., $12,600,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Del., Summit Bridge—SHEET PILE—U. S. Eng., Wilmington, 19,200 sq.yd. steel sheet pile, at cutoff wall.

Fla., Miami—AIRPLANE HANGAR—U. S. Coast Guard airplane hangar and improving Coast Guard Station, 6½ acre site, Dinner Key Airplane Base. **$60,000.**

Illinois—DREDGING—U. S. Eng., Chicago, 66,000 cu.yd. earth and removing 161,000 cu.yd. rock from Starved Rock Pool, on Illinois Waterway.

Ky., Louisville—FEDERAL PRISON—Dpt. Justice, Wash., D. C., 1 story federal prison, 20 mi. south of here. **$150,000.**

Mich., Detroit—IMMIGRATION OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., 3 story immigration office, East Jefferson Ave. $150,000.

Mississippi—EARTHWORK—U. S. Eng., P. O. Box 667, Vicksburg, cancelled bids to have been opened Dec. 22, for 32,350 cu.yd. earthwork due to anticipated unfavorable river stages. Noted Dec. 17.

Miss., Columbia—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans by Shourds & Bean, Gulfport, Miss., 1 story, basement, rein.-con., brick, $70,000. J. A. Wetmore, Wash., D. C., acting superv. Noted Dec. 3.

N. J., Bergenfield—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., 2 story, basement, brick, steel post office. $150,000. **Maturity in Spring.**

N. J., Newark—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., Wash., D. C., bids in February, general contract 5 story, basement, brick, steel, post office, court house, Walnut and Franklin Aves., Mulberry, Vroom Valley and Washington Sts. $6,150,000. W. E. Lehman and G. Oakley, 972 Broad St., archts. J. A. Wetmore, c/o owner, superv. archts. W. H. Dusenberry, 1841 Bway., New York, mechanical engr. J. DiSteffo c/o archts., structural engr. Noted Sept. 3.

O., Fairfield—HANGARS, etc.—Con. Q. M., Patterson Field, soon takes bids 2 brick, steel hangars; 2 story, basement, 46x118 ft. administration building; 1 oil storage building, concrete roadways, $50,000. Total $250,000.

BIDS ASKED

Ark., Texarkana—ELEVATOR—Jan. 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., elevator in U. S. Post Office.

Calif., Oakland—ELEVATOR—Jan. 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., elevator in U. S. Post Office.

Ga., Americus—ELEVATORS—Jan. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., elevators in U. S. Post Office.

Minn., Owatonna—POST OFFICE—Jan. 7, by Treas. Dpt. at office Sup. archt., Wash., D. C., U. S. Post Office.

Mo., Cape Girardeau—POST OFFICE, etc.—Jan. 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office and Court House; adv. E. N.-R. Dec. 31.

Mo., Kansas City—PONTOONS—Jan. 4, by U. S. Eng., 707 Postal Telegraph Bldg., 20 steel pontoons, with pivot bearing pipe carriers; 20 sects. electrically welded 34 in. inside diam. steel pipe with flanges on ends except as noted in specifications; 4 cast steel elbows; 2 w.i. nipples, 4 connecting bars; 2 deflector plates and 2 capstans. Noted Oct. 1.

N. Y., Champlain—INSPECTION STATION—Jan. 22, by Treas. Dpt. at office Sup. Archt., Wash., D. C., inspection station.

O., Cincinnati—LOCKKEEPERS HOUSES—Jan. 20, by U. S. Eng. Office, Cincinnati, three one-story frame lockkeepers' houses; adv. E. N.-R. Dec. 31.

O., Marietta—TOOL STEEL—Jan. 8, by U. S. Eng., Huntington, W. Va., water-tempered annealed tool steel, at Repair Station.

O., Springfield—POST OFFICE—Jan. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., founds. for U. S. Post Office.

Okla., Norman—POST OFFICE—Jan. 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office. Noted Feb. 5.

Va., Hampton Roads — ADMINISTRATION BUILDING—Spec. 6466—Jan. 6, by Yards & Dpt., Wash., D. C., 2 and 3 story, basement, 128 x 214 ft. rein.-con., concrete and wood piles, at Navy Yard.

W. Va., Huntington—ELECTRICAL SUPPLIES—Jan. 5, by U. S. Eng., electrical supplies.

W. Va., Huntington—SUPPLIES—Jan. 11, by U. S. Eng., miscellaneous supplies, for U. S. Locks, Ohio River.

Wis., Milwaukee—FILTERS—Jan. 19, by Treas. Dpt. at office Sup. Archt., Wash., D. C., filters for heating system, at U. S. Post Office and Court House, Custom House; adv. E. N.-R. Dec. **31.**

Alaska, Fairbanks—FEDERAL BUILDING—Feb. 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, Court House, jail, etc. (except elevator); adv. E. N.-R. Dec. 31. Noted Dec. 17.

T. H., Pearl Harbor—OVERHAUL SHOP—Spec. 6376—Feb. 3, by Yards & Docks, Navy Dpt., Wash., D. C., building for engine and aircraft overhaul shop, at Naval Operating Base. Noted Dec. 10.

CONTRACTS AWARDED

Ala., Mobile—GENERATING SET—U. S. Eng., 1 complete diesel electric generating set with integral bed plate and accessories and switchboard, to Winton Eng. Corp., 2160 West 106th St., Cleveland, O., $5,100. Noted Nov. 18.

Conn., New London—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, to V and M Constr. Co., 68 Cowles Ave., Yonkers, N. Y. Noted Nov. 26.

D. C., Wash — HOSPITAL — Dpt. Interior, treatment building, dining hall at St. Elizabeth's Hospital, to W. E. O'Neill, 308 West Washington St., Chicago, Ill., $543,900; elevators, to Atlantic Elevator Co., D and Erie Aves., $2,490. Noted Oct. 22.

D. C., Wash. — LABORATORY — Yards & Docks, Navy Dpt., Wash., D. C., 3 story, basement, 61 x 128 ft. brick laboratory building extension at Naval Research Laboratory, at Bellevue, to Blackford Co., Greensboro, N. C., $101,443. Noted Nov. 19.

Ill., Cairo—PILING DIKES—U. S. Eng., 428 Custom House, St. Louis, Mo., 4,000 lin.ft. piling dikes at Crain Island and Rockland above here, to Patton & Tully, Memphis, Tenn., $156,555. Noted Nov. 19.

Missouri—DIKES—U. S. Eng., Kansas City 9,865 ft. dikes and 3,000 ft. revetment in Missouri River at McKirks Island and Hermann Reaches to Woods Bros. Constr. Co., 133 South 13th St., Lincoln, Neb., $325,478. Noted Oct. 22.

Missouri—PILE DIKES—U. S. Eng., Postal Telegraph Bldg., Kansas City, 10,580 lin.ft. dikes in Missouri River to Grand River and Bushwacker Bends, to Kansas City Bridge Co., 510 Orear Leslie Bldg., Kansas City, $317,504; 6,610 lin.ft. at Straubs and Gasconade Bends, to Woods Bros. Constr. Co., 133 South 13th St., Lincoln, Neb., $175,030. Noted Oct. 22.

Pa., Pittsburgh—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., Wash. D. C., superstructure U. S. Post Office, Court house, to Arnberg-Fried Co., 21 East 40th St., New York, $4,596,000. Noted Nov. 12.

Tenn., Elizabethton—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to C. A. Morrison & Son, Shelby, N. C., $67,066. Noted Nov. 19.

Texas—DREDGING—U. S. Eng., Galveston, 3,251,000 cu.yd. in Galveston Channel, to Standard Dredging Co., 233 Bway., New York, and 323 Guaranty Bldg., Galveston, $150,846. Noted Oct. 15.

SUBWAYS AND TUNNELS

PROPOSED WORK

New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, Queens Co. preliminary plans completed and approved and authorized by Bd. Estimate 13.92 track miles 120th Ave.-Springfield Blvd. Line, Hawtree St. to Foch Blvd., Queens Co. $9,500,000.

N. Y., Yonkers—City, c/o Mayor, vehicular tunnel from Manor House Sq. to Sawmill River Rd. **Maturity indefinite.**

GRADE CROSSINGS

PROPOSED WORK

Texas—State Hy. Comn., W. R. Ely chn., Austin, steel, concrete overpass over Beaumont, Sour Lake & Western R.R. on Hy. 132, State Aid Project 955-B, Liberty Co. G. A. Bracker, liberty, resident engr.

DAMS

PROPOSED WORK

Okla., Ponca City—See "Waterworks."

PIERS AND WHARVES

CONTRACTS AWARDED

N. Y., New York—PIERS—Allen N. Spooner & Sons, Pier 11, North River, awarded subcontracts for piers at 48th, 50th, and 52nd Sts., 120,000 cu.yd. earth and 400,000 cu.yd. rock excav., to C. L. Smith, Inc., 405 Lexington Ave., for Dpt. Docks, Pier A, Battery Pl. Noted Nov. 5 under "Contracts Awarded."

POWER AND LIGHTING

PROPOSED WORK

Okla., Oklahoma City—Oklahoma Gas & Electric Co., W. R. Emerson, secy., 321 North Harvey St., extending underground distribution system. $75,000. Byllesby Eng. Co., 231 South La Salle St., Chicago, Ill., engrs.

Okla., Oklahoma City—Oklahoma Natural Gas Co., South Boston St., Tulsa, W. P. Canavan, vice pres., gas distribution system, gas mains in wholesale dist. $50,000. Private plans.

CONTRACTS AWARDED

New Jersey—Bd. Blvd. Comrs., Court House, Jersey City, installing electrical equipment for traffic light signal system, on Hudson County Blvd., to A. Neri, Inc., 928 Washington St., Hoboken, $50,700; traffic signal equipment, to General Electric Co., 20 Washington Pl., Newark, $39,845; concrete and general construction work, to J. Strada, 431 10th St., West New York, $6,557. Grand total $97,102. Noted Dec. 1.

PARKS AND SPORTS

PROPOSED WORK

Conn., Windsor—See "Schools."

Mass., Boston—Park Dpt., 33 Beacon St., grading, rock excav., at J. J. Connolly Playground, Roxbury. $25,000. Will readvertise.

Mass., Somerville—City, Dpt. P. Wks., field house, improvements, at Lincoln Park. $25,000. $30,000.

N. Y., New York—Bd. Trustees New York State Roosevelt Memorial, Museum Natural History, 15 West 77th St., sketches memorial approaches and landscaping, 79th St. and Central Park. $100,000. **Maturity in spring.** John Russell Pope, 542 5th Ave., archt.

N. Y., New York—Dpt. Parks, Municipal Bldg., park, on East River, near and below Houston St. To exceed $100,000. Site being acquired.

Tex., Alamo—Rio Grande Valley Sportsman's Club, c/o E. R. Redlich, pres., Alamo, plans country club improvements, incl. landscaping 700 acres (for club building), gardens, two 18-hole golf courses, tennis courts, two polo fields, 190 x 450 ft. baseball diamond, outdoor concrete swimming pool, dredging 2,800 ft. lakefront, constructing 400 ft. lake, L. Macomber, 111 West Wash. St., Chicago, Ill., constr. engr.; sketches by R. H. Bullard, 607 5th Ave., New York, 2 story, 160 x 240 ft. country club, incl. grille, dining room, bowling, lockers, billiard, laundry, auto repair shop, gun room, sporting goods store, gymnasium, etc., near here, L. H. Armstrong, c/o owner, engr.

Wisconsin—State Hy. and Conservation Comn., Madison, plans improving state parks during 1932, incl. constructing, maintaining, dust alleviating roads in Devils Lake, Peninsula State, Interstate, Nelson-Dewey, Perrot, Rib Hill, Belmont State, Tower Hill, Terry-Andrae, Copper Falls, Brule and Potowatomi Parks; and in Northern and American Legion State Forests at Fish Hatchery; and in Brule, Douglas Co.; Winchester, and Spider Lake, Vilas Co., and in Mercer, Iron Co. $212,500.

Ont., Toronto—City Council concrete, rein.-con. swimming pool, chlorinating and purifying equipment, shower, dressing and locker rooms, at Eastern Beaches. $40,000-$50,000. R. C. Harris, city engr.

BIDS ASKED

N. Y., Long Island City—Jan. 5, by Park Bd., W. R. Herrick, pres. Park Bd., Arsenal Bldg., Central Park, New York, cold asphaltic concrete surfaced walk from North Hempstead Turnpike to Lake Kissena Park; grading areas between Barclay St., the wading pool and athletic field; walks, curbs, general improvement in Rose and Oak Aves., Kissena Park, all Queens Boro.

CONTRACTS AWARDED

N. Y., Long Island City—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, reconstructing golf links at Forest Park, to A. Ross, 389 Kent Ave., Brooklyn, $36,275. Noted Nov. 12.

HEATING AND VENTILATING

PROPOSED WORK

Mass., Roxbury—New England Deaconess Hospital, H. Brewer, pres., heating plant at hospital, Deaconess Rd. $75,000. Engineer not appointed.

CONTRACTS AWARDED

R. I., Pawtucket—Memorial Hospital, Prospect St., heating in dormitory, Prospect St., to Lincoln & Lane, 30 Bayley St., Pawtucket; plumbing, to F. Dupuis Co., 597 Main St., Pawtucket; electrical work, to Mullen Bros., 15 Harrison St., Pawtucket. Total est. $25,000. Noted Dec. 24, under "Hospitals, Contracts Awarded."

UNCLASSIFIED

PROPOSED WORK

N. Y., Pocantico Hills — STABLES — J. D. Rockefeller, Jr., 26 Bway., New York, soon takes bids general and separate contracts stables and silo. $150,000. G. Atterbury, 139 East 53rd St., New York, archt. Foundation work underway. Noted Oct. 29.

Ont., Wyoming—PIPE LINE—Union Natural Gas Co., 5th Ave., Chatham, E. C. Steele, ch.

Unclassified (Continued)

engr., 5 mi. pipe line to Wyoming and constructing distributing system.

Que., Montreal — AMPHITHEATRE — Leo Dandurand sketches amphitheatre St. Alexander and Dorchester Sts. $3,000,000. **Maturity about Feb. 1.** Architect not appointed.

BIDS ASKED

N. J., Bloomfield—HOUSING DEVELOPMENT—See "Contracts Awarded."

CONTRACTS AWARDED

Kan., Eldorado—OIL PIPE LINE—Skelly Oil Co., Skelly Bldg., Tulsa, laying 30 mi. 8 in. pipe line at El Dorado Oil Fields, to Truman-Smith Constr. Co., c/o owners. Noted Dec. 24.

Mo., Kansas City—ELEVATOR—New York Life Insurance Co., N. Y. Life Bldg., reconstructing elevators New York Life Bldg., to Otis Elevator Co., 1920 Wyandotte St. Est. to exceed $50,000.

N. J., Bloomfield—HOUSING DEVELOPMENT—Walter Johnson Jr., Homes, Inc., 16 Alden Terrace, housing development, road work, water and sewage development, Broad St. and Overlook Terrace, Brookdale, separate contracts. To exceed $500,000. **Maturity early in spring.**

N. Y., Flushing—COMFORT STATION—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, general contract comfort station, to J. A. Lee, 14th Rd., College Point, $14,882; heating to H. Silver, $1,820. Noted Dec. 3.

N. Y., New York — ELEVATORS — Turner Constr. Co., Graybar Bldg., 12 signal control passenger elevators, 12 micro-leveling freight elevators, 4 extra large truck elevators, 8 baggage elevators, 1 ash lift, 1 service elevator, to Otis Elevator Co., 11th and 26th Sts., for Port of New York Authority, 80-90 8th St. Noted Oct. 1.

Tex., Beaumont—OIL PIPE LINE—Yount-Lee Oil Co., Inc., San Jacinto Life Bldg., 45 mi. 6- to 8-in. oil pipe line from here to High Island, to N. A. Saigh Co., c/o Builders' Exch. Bldg., San Antonio. $80,000. Noted Dec. 3.

Tex., San Antonio—SUB-DIVISION DEVELOPMENT—G. C. Hagelstein, St. Mary St., developing 135 acre Homeside sub-division, incl. watermains, laterals, 4 mi. pipe laying, to San Antonio Water Bd., 108 Market St.; piping same for natural gas distributing sub-division in Woodlawn Hills, to San Antonio Pub. Serv. Co., South St. Marys St.

MATERIALS

BIDS ASKED

GRAVEL and SAND—**Chicago, Ill.**—Jan. 4, by City at office Bureau Eng., Dpt. P. Wks., City Hall, furnishing, delivering by rail and truck washed gravel and torpedo sand required during term ending Dec. 31, 1932. A. A. Sprague, comr.

CULVERT PIPE, LUMBER, etc.—**Marengo, Ia.**—Jan. 6, at office Auditor Iowa Co., 1 car corrugated metal culvert pipe, 6 car loads bridge lumber, 2 cars untreated piling, 1 car untreated piling and lumber. Address County Engineer or Auditor, Marengo.

GASOLINE, OILS, etc.—**Primghar, Ia.**—Jan. 6, at office Auditor O'Brien Co., 50,000 gal. gasoline, 1,100 gal. lubricating oils. W. L. Anderson, Primghar, co. engr.

BRIDGE LUMBER—**Laurel, Miss.**—Jan. 6, by Bd. Supervs. Jones Co., 150,000 ft. treated and 60,000 ft. untreated bridge lumber for construction bridges.

BRIDGE PLANKS—**Trenton, N. J.**—Jan. 5, by L. Focht, engr., State Office Bldg., 44,401 ft. creosoted bridge planks, delivered to Titusville, for Joint Comn. for Illumination Toll Bridges.

PORTLAND CEMENT—**Brooklyn, N. Y.**—Jan. 4, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, 5,000 bbl. portland cement, 5,000 cu.yd. steam cinders; 600,000 gal. asphaltic cement; 4,000 tons limestone or other inorganic dust; 15,000 cu.yd. asphalt sand; 10,000 cu.yd. binder stone; 6,000 cu.yd. sand for concrete and paving.

BROKEN STONE, etc.—**Long Island City, N. Y.**—Jan. 4, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., 30,000 cu.yd. broken stone and screenings; 30,000 cu.yd. steam ashes; 600,000 gal. asphaltic cement in barges alongside of dock; 1,500 tons asphalt cement; 1,000,000 gal. road oil; 700,000 gal. fuel oil; 300,00 gal. gasoline.

FENCE—**Yonkers, N. Y.**—Jan. 15, by Westchester Sanitary Sewer Comn., Court House Annex, White Plains, 1,000 lin.ft. woven steel galvanized wire fabric fence and 200 lin.ft. rustic wood fence. W. W. Young, consult. engr.; adv. E. N.-R. Dec. 31.

CONTRACTS AWARDED

CAST IRON PIPE—**Memphis, Tenn.**—Water Comrs., J. Sheehan, supt., 105-7 2nd St., 3,225 ft. 30 in. and 7,775 ft. 24 in. Class B c.i. pipe, to United States Cast Iron Pipe & Fdry. Co., Amer. Traders' Natl. Bank Bldg., Birmingham, Ala., at $5.48 and $2.84 per ft. respectively.

REFINED ASPHALT, etc.—**Toronto, Ont.**—City, 1932, annual supplies awarded as follows: to Imperial Oil Co. Ltd., 56 Church St., refined asphalt in tank car at $13.92 per ton, in metal containers $18.58; to Consolidated Sand and Gravel Co. Ltd., Harbor Bldg., mineral dust in car lots f.o.b. siding at $5.75 per ton; to Alfred Rogers Ltd., 357 Bay St., and Canada Cement Co. Ltd., Northern Ontario Bldg., portland cement in carload lots at $2.28 per bbl.; to Standard Underground Cable Co. of Canada Ltd., 268 King St. W., 3- to 1-in. lead pipe per 100 lb. $5.30; to Canadian Industries Ltd., 372 Bay St., liquid chlorine and sulphur dioxide in 2,000 lb. containers at $115 per ton, in 150 lb. containers $174.32 per ton, in 2,000 lb. containers $121.76 per ton; to Natl. Iron Corp., ft. of Cherry St., cast iron pipe sand cast in 12 ft. lengths 4 in. at $7.50, 6 in. $11.50, 8 in. $16.75, 10 in. $23, 12 in. $30; Delavaud cast pipe, 16 ft. lengths, 4 in. $6.96, 6 in. $10.80, 8 in. $16.44, 10 in. $22.56, 12 in. $29.76; to Standard Brick Co., 500 Greenwood Ave., sewer brick delivered per 1,000 brick, $23.75. Total est. $100,000.

EQUIPMENT

PROPOSED WORK

FIRE ALARM BOXES—**Cambridge, Mass.**—city, c/o City Electrician, rejected bids furnishing fire alarm boxes and police signal boxes, as specified. **May** readvertised.

ROAD MACHINERY—**Madison, Wis.**—Funds appropriated for purchase during 1932, Adams Co. road maintenance machinery $6,000; Ashland Co. 1 large truck and several patrol graders $8,000; Barron Co. road maintenance machinery $25,000; Bayfield Co. patrol graders $5,000; Brown Co. patrol graders $20,000; Burnett Co. road maintenance machinery $3,000; Calumet Co. road maintenance machinery $3,000; Chippewa Co. 2 large trucks—Columbia Co. 1 truck and 10,000 ft. snow fence; Dane Co. road maintenance machinery $10,000; Crawford Co. 1 motor grader, 4 snow plows $4,000; Dodge Co. 1 truck, 1 oil distributor; Dougles Co. hydraulic spring blade and miscellansous tools $2,500; Dunn Co. combination rock and gravel plant $5,000; Eau Claire Co. road maintenance machinery $10,000; Grant Co. 6 motor graders $12,000; Green Co. 4 motor graders, 1 large truck; Green Lake Co. 1 gyratory crusher, 1 light truck, 1 hydraulic truck blade 1½ yd. shovel—Iowa Co. motor graders $3,000; Jefferson Co. road maintenance machinery $5,000; Juneau Co. 2 motor graders $8,000; Kewaunee Co. maintenance machinery $5,000; Manitowoc Co. 1 truck plow, 1 large truck, 1 small truck 3 motor graders, 1 air compressor $38,000; Marathon Co. road maintenance machinery $38,000; Marinette Co. road maintenance machinery $5,000; Marquette Co. 1 tractor; Monroe Co. 2 trucks, 1 snow plow, 1 motor grader, and elevating grader; Ocqnto Co. oil distributor, 4 light trucks, air compressor, $14,622; Outagami Co., 2 large trucks and other maintenance machinery $30,000; Pepin Co. 1 motor grader $2,000; Pierce Co. 2 large trucks $10,000; Polk Co. snow plows $5,000; Portage Co. some trucks and other equipment $5,000; Rock Co. maintenance machinery $5,000; Rusk Co. 1 motor grader $7,000; St. Croix Co. tractors and truck snow plows; Sauk Co. motor graders $10,000; Sawyer Co. road maintenance machinery $5,000; Trempealeau Co. 1 motor grader, 1 oil distributor $10,000; Washburn Co. 2 truck snow plows, 1 tractor plow $6,000; Waupaca Co. motor graders $1,000; Waushara Co. motor trucks and equipment; Winnebago Co. road maintennce equipment $5,000; Wood Co. motor graders and equipment $70,000.

BIDS ASKED

CUTTING EDGES, DRAG BLADES, etc.—**Dakota City, Ia.**—Jan. 5, at office Auditor Humboldt Co., 50 sets curved cutting edges for motor graders, 30 sets drag blades for Adams No. 6 with extensions, 200 ft. curved cutting edges for various makes of graders, also 65,000 gal. gasoline, 2,000 lb. track roller grease, 1,200 lb. pressure gun grease, 1,000 lb. auto transmission oil, 2,500 gal. motor oil from SAE-10 to SAE-70. S. M. Helgeland, Humboldt, co. engr.

TRACTOR—**Carlton, Minn.**—Jan. 5, by O. W. Samuelson, aud. Carlton Co., 1 track-type tractor, not under 60 hp.

PUMPING EQUIPMENT—**New York, N. Y.**—Jan. 5, by Bd. Transportation, J. H. Delaney, chn., 25 Hudson St., overhauling installing pumping equipment for Routes 13, 107, 108 and 110, Manhattan, Brooklyn and Queens Boros., agreement "LO".

SNOW PLOWS — **Sheboygan, Wis.** — A. L. Boly, engr., City Hall, taking bids 3 snow plows to be attached to trucks for City. $1,500.

GENERATOR—**Two Rivers, Wis.**—Jan. 12, by City, E. J. Donnelly, mgr., generator and switchboard.

FOREIGN

Brazil—Apr. 30, by Government of Brazil, Rio de Janiero, electrification of railroad lines around Rio de Janiero, a part of the Central of Brazil R.R. system. S. Sampaio, New York, consul genl. Noted Aug. 27.

Chili—Dpt. P. Wks., Santiago, proposed that trans Andean railroad from Antofagasta, Chile, to Salta, Argentine, be built by granting concession. **Maturity late 1932.** Noted Aug. 19.

Denmark—F. Skotte, minister Transportation, Copenhagen, introduced in Folketing a bill proposing construction 3 railway road bridges across Storsstrommen, Masnedsund and Oddesund. Est. $7,700,000.

Egypt, Cairo—Feb. 18, by Ministry of Interior, Cairo, supply and delivery of pumps, electric motors, for Smalbout waterworks.

Union Socialist Soviet Republics—Government, c/o Amtorg Trading Corp., 261 5th Ave., New York, 19.5 mi. traction and street railway lines to connect Zaparozhye with Dnieper River Power Plant; 9 mi. connecting workers settlements with factories in Mariupol; also in Lugansk, Dimitievsk, Kamensk, Kramator, Konstantinovka, by day labor, separate and technical aid contracts.

U. S. S. R., Kharkov (Ukraine Province)—Municipality, c/o Amtorg Trading Co., 261 5th Ave., New York, civic group incl. 30,000 kw. power addition; workers housing, auditorium, civic buildings, by technical aid contractors. $31,000,000.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

N. J., East Orange — See "Contracts Awarded."

N. J., Paterson—See "Contracts Awarded."

CONTRACTS AWARDED

N. J., East Orange—Interstate Properties Corp., c/o S. N. Bobo, 369 Lexington Ave., New York, apartment, separate contracts. W. D. Foster, 25 West 45th St., New York, archt.

N. J., Paterson—Letz & Katz, 555 East 27th St., 5 story, basement, brick, steel apartment, Carroll St., separate contracts. $150,000. J. Holt, 134 Market St., archt. Noted Dec. 17.

CLUBS

PROPOSED WORK

N. J., Jersey City—A. Davis, archt., 140 Montgomery St., soon takes bids general contract 2 story, basement, brick, steel, Liberty and St. Paul's Aves., for Polish American Democratic Club, H. Sieminsky, chn. Building Comn., Pavonia Ave. $150,000.

N. J., Ridgefield—Ridgefield Square Club Broad Ave., plans 2 story, basement, brick, steel club-house, Broad and Elm Aves. $150,000. **Maturity soon.** Site purchased. Architect not appointed.

N. Y., New York—Owner, c/o M. C. Berg, 200 West 50th St., club, 153 West 81st St. $250,000.

HOSPITALS

PROPOSED WORK

Calif., Alta Loma — F. H. Johnson, 1601 North Wilcox Ave., Los Angeles, sketches reinf.-con., steel sanatorium. $150,000.

Mass., Boston—City, Hospital Dpt., surgical research laboratory unit at Boston City Hospital, Harrison Ave. $500,000 bequeathed by C. H. Tyler, Beverly, for this purpose. Architect not appointed.

Mo., St. Louis—City, Bd. P. Serv., City Hall, bids in spring, service building, boiler house, laundry, dining hall, as (1st unit) Negro City Hospital Group $350,000; bids later 6 story basement rented, two 5 story wings, nurses' home and superintendents' quarters. Total est $2,000,000; $1,200,000 now available. A. Osburg, city archt. L. R. Bowen, city engr. Noted Sept. 17.

N. H., Exeter — Exeter Hospital, Prospect Hill, sketches by Kendall, Taylor & Co., 269 Columbus Ave., Boston, Mass., hospital alterations. $150,000.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, plans by J. E. Kleist, 25 West 45h St., New York, 4 story, 41 x 137 ft. doctors' dormitory, Brooklyn Ave. and Winthrop St. at Kings County Hospital. $185,000.

Pa., Phila.—Episcopal Hospital, R. L. Montgomery, chn., Fidelity-Philadelphia Bldg., sketches hospital, Front and Lehigh Sts., $300,000. Architect not appointed.

Pa., Phila.—Skin and Cancer Hospital Assn., E. B. Moore, 806 Pine St., plans by H. M. Wilson, 18th and Brandywine Sts., hospital, 802-18 Pine St.

BIDS ASKED

Md., Buena Vista—Jan. 5, by District Comrs., Wash., D. C., nurses home, tuberculosis sanitorium. $203,000.

N. J., Preakness—Bd. Freeholders Passaic Co., Court House, Paterson, bids about Mar. 15, general contract 2 story, basement, brick, steel preventorium (children's unit), Valley View. $500,000. F. Wentworth, 140 Market St., archt. F. J. Vreeland, 140 Market St., assoc. arch. Noted Oct. 1.

N. Y., Kings Park—Jan. 20, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, completing reception building, employees building, kitchen and dining room building, altering and constructing addition to Building 2, Kings Park State Hospital; adv. E. N.-R. Dec. 31.

CONTRACTS AWARDED

Ill., Quincy—C. H. Hammond, superv. archt., c/o State of Illinois, Capitol Bldg., Springfield, general contract 1 story, 139 x 220 ft., reinf.-con., brick hospital at State Soldiers and Sailors' Home, to J. L. Simmons Co., 101 North 5th Ave., Springfield, $82,444; plumbing, heating and ventilating, to J. P. Shields, 214 West Monroe St., Bloomington, $21,319; electrical work, to Wilson Electric Co., 1135 Madison St., Rockford, $6,464. Grand total $110,227. Noted Nov. 26.

Mass., Fall River—Union Hospital, 338 Prospect St., 4 story, basement, brick, stone, steel, nurses home, plain found., to Carey Quarry & Constr. Co., 56 North Main St. Est. $200,000. Noted Dec. 17.

Constr. News page 237

CHURCHES

PROPOSED WORK

Mass., New Bedford—Holy Name Roman Catholic Church, T. P. Sweeney, pastor, 765 County St., sketches by Maginnis & Walsh, Statler Bldg., Boston, 1 story, basement, brick church, $150,000 or more. Noted Oct. 29.

N. J., Pleasantville—St. Peter's Lyceum, F. J. McCallion, pastor, sketches by E. G. Perrot, 1211 Arch St., Phila., Pa., 2 story, basement, brick, steel church, rectory, $150,000 or more.

N. J., Princeton—Owner, c/o F. F. Durang, archt., 110 West Dudley Ave., Westfield, bids about Jan. 15, 2 story, basement, brick, steel chapel. $150,000. Noted Dec. 17.

BIDS ASKED

N. J., Union City—Mahnken & Schultz, archts., 26 Journal Sq., Jersey City, bids about Feb. 1, general contract 2 story, basement, brick, steel store, office, Bergenline Ave. and 36th St., for A. Holthousen, 713 Bergenline Ave. $150,000. Former bids rejected.

CONTRACTS AWARDED

Mass., Winchester—Immaculate Conception Roman Catholic Church, J. F. Fitzsimmons, pastor, 928 Main St., 1 and 2 story, basement, brick, stone church chapel, plain found., Sheridan Circle, to Wakefield Mfg. Co., Lowell St., Wakefield. $150,000 or more. Noted Dec. 3.

SCHOOLS

PROPOSED WORK

Calif., Arcata—F. T. Georgeson, archt., 6th and C Sts., Eureka, completing plans 3 story, basement, rein.-con. training school, for State of California. $160,000. Noted Feb. 19.

Calif., Oakland—Mills College plans by W. H. Ratcliff, Jr., Chamber of Commerce Bldg., Berkeley, 2 story, basement, rein.-con. dormitory. $150,000.

Conn., Windsor—Loomis Institute, N. H. Bachelder, headmaster, plans by R. H. Dana, Jr., 350 Madison Ave., New York, brick, steel, concrete gymnasium addition, auditorium, basket ball court, swimming pool, etc. $175,000. G. Hadden, 607 5th Ave., New York, engr. Will probably award contract without competition in February.

Conn., Shelton—City, Superintendent Schools, sketches by B. C. Dillon, 254 Main St., Derby, two 2 story, basement, brick, high school additions, Coram Ave. $150,000.

Del., Wilmington—Bd. Educ., 2613 Eaton Pr., City Hall, plans by E. D. Martin, Du Pont Bldg., school to accommodate 1,100 pupils, 36th and Jefferson Sts.

Ind., Lafayette—Purdue University, West Lafayette, plans by W. Scholer, Lafayette, 3 story, basement, 60 x 230 ft., rein.-con., brick, stone, tile, steel sash mechanical engineering building, on campus. $200,000.

Ind., Muncie—Ball State State College plans by G. F. Schrieber, 801 Architects Bldg., Indianapolis, fine arts building, library, both 3 story, basement, rein.-con., brick, stone, on campus, $325,000 and $50,000 respectively.

Ind., Sellersburg—School Comrs. plans by C. Byfield, 916 Peoples Bank Bldg., Indianapolis, 2 story, basement, rein.-con., brick grade school. $150,000.

Mich., Northville—Wayne County Training School plans by N. O. Gould, Empire Bldg., Detroit, 2 story, 115 x 410 ft., brick, rein.-con. vocational school, plain found.

Mo., St. Louis—St. Louis Catholic High Schools, c/o P. J. Ritchie, 2431 North Grand Blvd., sketches rein.-con., brick, stone boys' high school, Grand Blvd. and Delor St. **Maturity indefinite.**

N. J., Clifton—Bd. Educ., High School, revised sketches by Lee & Hewitt, archts., 152 Market St., Newark Richfield School 2, 2 story, basement, brick, steel, Conrad Ave. between Broad and Grove Sts. $200,000.

N. J., Carlstadt—Bd. Educ., Boro Hall, plans by G. F. Beal, 241 Bell Ave., Hasbrouck Heights, 2 story, basement, brick, steel grade and junior high school, Washington St. $150,000. Noted Oct. 29.

N. J., Newton—Bd. Educ. revised sketches by Hacker & Hacker, 201 Main St., Fort Lee, Junior High School, 2 story, basement, brick, steel, $150,000. Noted Sept. 24.

N. Y., Pleasant Valley—C. J. Cooke, archt., 20 Cannon St., Poughkeepsie, making sketches school, auditorium. $175,000.

N. Y., Poughkeepsie—E. C. Smith, archt., 39 Market St., making sketches school, auditorium and gymnasium for Union Free School Dist. 7. $250,000.

R. I., Newport—City, H. T. Lowe, supt. schools, plans by D. S. Shapiro, Globe Bldg., Fall River, Mass., Junior High School, Thayer St. $150,000 or more.

R. I., Newport — City, H. T. Lowe, supt. schools, plans by D. S. Shapiro, Globe Bldg., Fall River, Mass., 3 grade schools, additions, alterations, Mary, Elm and Cranston Sts. $150,000.

Wis., Port Edwards—Bd. Educ., F. H. Rosebusch, clk., rein.-con., steel school. $150,000 voted. Architect not appointed.

BIDS ASKED

Ark., Forrest City—Jan. 11, at office E. B. Smith, secy. Forrest City School Dist. 7, 2 story, brick school. W. C. Lester, Dermon Bldg., Memphis, Tenn., archt.

Delaware—Jan. 5, by H. V. Holloway, state supt. Pub. Instruction, Dover, John M.Clayton Consolidated School, 2 story, basement, 163 x 220 ft., rein.-con., brick, timber, plain found., between Frankford and Dagsboro, for Frankford-Dagsboro Consolidated Dist. 97. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts. Delaware School Foundation, 4130 Du Pont Bldg., Wilmington, engrs.

N. Y., Syracuse—Jan. 12, by Commissioner Dpt. Education, Education Bldg., Albany, Forestry Science Building, College of Forestry, Syracuse University; adv. E. N.-R. Dec. 31. Noted Dec. 24.

Mass., Melrose—Jan. 20, by City, R. A. Perkins, mayor, at Mayor's office, City Hall, 2 story, basement, brick, stone, steel high school, $750,000; heating, plumbing and electrical work, $25,000 or more; concrete piling found., $25,000. J. W. Beal Sons, 185 Devonshire St., Boston, archts. F. E. Ellis, City Hall, engr. Noted Oct. 29.

N. J., Berkshire Valley—Jan. 12., by Bd. Educ., School House, 2 story, basement, brick, steel addition to Milton School. $150,000. J. J. Vreeland & Son, 16 West Blackwell St., Dover, engrs.

Pa., Lancaster — Bd. Educ., J. S. Graybill secy., 407 West Chestnut St., taking bids 2 story, 200 x 208 ft., rein.-con., brick, steel school and gymnasium, plain found. $150,000. H. Y. Shaub, 20 North Queen St., archt.

CONTRACTS AWARDED

Ga., Atlanta—Atlanta University, 4 story, 52 x 319 ft., irregular sized men's dormitory, 4 story, 118 x 198 ft. L-shaped women's dormitory, limestone, rein.-con., to Barge-Thompson Co., 136 Ellis St. N. E. Est. $300,000. Contractor now taking sub-contract bids. Noted Nov. 19.

Ont., Hamilton—R. H. Proctor, City Hall, 3 story, basement, brick, concrete, stone, steel commercial school, Sanford Ave., to Frid Constr. Co., 128 King St. E., $446,000. Noted Dec. 10.

BANKS

CONTRACTS AWARDED

N. Y., New York—Marc Eidlitz & Sons, (contractors) 100 East 42nd St., awarded sub-contracts structural steel for 20 story bank and office, to Amer. Bridge Co., 71 Bway.; steel erecting, to Post & McCord, 101 Park Ave., for 1st Natl. Bank, 2 Wall St. Noted Nov. 19.

OFFICES

BIDS ASKED

N. J., Union—F. A. Elsasser, archt., 1000 Stuyvesant Ave., bids about Jan. 22, general contract 2 story, basement office building, store. $150,000. Noted Nov. 26.

CONTRACTS AWARDED

N. J., Newark—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad Street Sta., Phila., Pa., 1 story, basement, 65 x 140 ft., brick, steel office building and loading platform, 120-30 Poinier St., to J. Rich Steers, 17 Battery Pl., New York. Est. $200,000.

STORES

PROPOSED WORK

N. J., Long Branch—J. Heleotis, 904 Bergen Ave., Asbury Park, plans by H. I. Braun, 191 Bway., altering and constructing 3 story, basement, brick, steel store, apartment addition. $150,000. Noted Dec. 17.

N. J., Newark—H. Stevens, 480 Central Ave., sketches by E. A. McMurray, 350 Millburn Ave., Millburn, 2 story, basement, brick, steel store, apartment, 18th Ave. $150,000. Noted Dec. 17.

PUBLIC

PROPOSED WORK

Mass., Arlington—TOWN OFFICE—Town, Bd. Selectmen, sketches by Gay & Proctor, 248 Boylston St., Boston, town office building, Mass. Ave. $150,000.

N. J., Bergenfield—LIBRARY—Bd. Boro Council, Boro Hall, 2 story, basement, brick, steel. $150,000. **Maturity indefinite.** Architect not appointed.

N. Y., Brooklyn—COURT HOUSE—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, traffic court. To exceed $150,000. **Maturity indefinite.** Project not yet submitted to Bd. Estimate for funds and site approval.

CONTRACTS AWARDED

N. Y., Jamaica—ARMORY—Armory Bd., City Hall, general contract administration building for 104th field artillery, to T. J. Waters, 415 Lexington Ave., New York, $869,400; drill hall, to H. A. Harris, 16 East 43rd St., New York, $241,000 Noted Dec. 3.

UNCLASSIFIED

PROPOSED WORK

Mass., Quincy—HOME—Eventide Home for Aged People, E. R. Johnson, Newport Ave., Wollaston, plans by H. F. Keyes, 16 Arlington St., Boston, home. $350,000.

N. J., Newark—MERCANTILE—J. F. Colllins & Co., 140 Mulberry St., rejected bids general contract 4 story, basement, brick, steel, 249 Mulberry St., $150,000. H. J. and J. V. King, 222 Market St., archts. Architect may revise plans and go ahead with smaller project. Noted Sept. 17.

See proposal advertising on page 43

R. I., Woonsocket—HOME—St. Vincent De Paul's Society, c/o J. F. Hogan, archt., Grosvenor Bldg., Providence, sketches Old Folks Home, Blackstone St. $150,000 or more.

BIDS ASKED

Me., Portland—EXCHANGE—Jan. 4, by New England Telephone & Telegraph Co., 50 Oliver St., Boston, Mass., and Densmore, Le Clear & Robbins, archts., Park Sq. Bldg., Boston, Mass., 3 story, basement, brick, steel, concrete found. $150,000. Noted Dec. 17.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

N. Y., Camden—FACTORY—Camden Wire Co., rebuilding, repairing factory. $40,000.

N. Y., Van Etten—GAS PLANT, etc.—New York State Electric & Gas Corp., Central Ave., Ithaca gas plant, distribution system.

O., Cleveland—FACTORY—W. A. Howe Co. (mountings for lithographs). E. W. Reutner, pres.-treas., 2630 Payne Ave., sketches 2 story, brick, steel, East 27th St. $50,000.

Tex., San Benito—DRYING PLANT—California Vegetable Produce Co., c/o J. B. Pardieck, pres., Burbank, Calif., soon lets contract 1 and 2 story, brick, rein.-con., rein.-con. founds. Private plans.

Ont., Sarnia—PLANT—Perkins Bakery Co., Saginaw, Mich., plant for manufacturing bakery and confectionary machinery. Equipment desired.

BIDS ASKED

Ont., Kirkland Lake—GOLD MILLING PLANT—See "Contracts Awarded."

CONTRACTS AWARDED

N. Y., Lackawanna — FACTORY—Spring Perch Co., Stratford, Conn., 2 story, 60 x 200 ft. and 165 x 250 ft. brick, steel, Hamburg Turnpike, to Buffalo Tank Corp., 123 Lincoln Ave., $150,000.

N. Y., New York—LAUNDRY—Consolidated Laundries Corp., 122 East 42nd St., laundry and garage, to Commonwealth Industries, Inc., 103 Park Ave. Est. $50,000. Contractor now taking bids and awarding separate contracts. Noted Dec. 10.

Ont., Kirkland Lake—GOLD MILLING PLANT—Lake Shore Mines Ltd., 1 and 2 story, steel, corrugated iron, concrete, timber addition, incl. electric wiring, power and lighting, day labor. $250,000.

GARAGES

PROPOSED WORK

N. J., Little Falls—F. W. Wentworth, archt., 140 Market St., Paterson, revising plans 22 story, basement, brick, steel, garage, Main St., for Little Falls Laundry Co., Main St. $150,000. Former bids rejected. Noted Dec. 10.

N. Y., New York—John Bradley, Inc., 19 Beach St., service garage, 555 Greenwich St To exceed $40,000.

N. Y., Woodside—R. Stonel, 39-22 Queens Blvd., Long Island City, service garage and gas station, Queens Blvd. and 51st St. Project pending building permit. **Maturity about July.** $40,000. Noted Dec. 10.

CONTRACTS AWARDED

Ind., Indianapolis—Indiana Refining Co., 38th St. and Central Ave., general contract rein.-con., steel super-service station, 38th St. and Central Ave., to Krebay Constr. Co., 108 East Pratt St. Est. $50,000.

POWER PLANTS

BIDS ASKED

O., Piqua—Jan. 6, by City, c/o Comrs., steam or electric power plant, turbine generator, surface condensers and steam generating unit, incl. boilers, exhaust fans, motors, etc. Diesel engine. $810,000. Burns & McDonnell Eng. Co., 406 Interstate Bldg., Kansas City, Mo., engrs. Noted Nov. 12.

WAREHOUSES

PROPOSED WORK

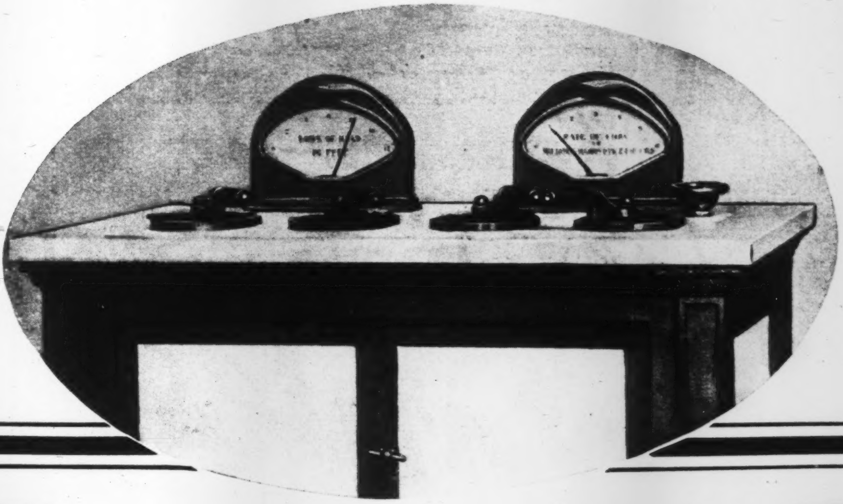
N. J., Newark—Alliance Investment Co., 790 Broad St., revised plans by T. C. Hughes, 15 Central Ave., altering and constructing 2 story, basement, brick, steel warehouse addition, Ogden and Rector Sts. $150,000. Former bids rejected. Noted Nov. 26.

BIDS ASKED

O., Cincinnati—Jan. 12, by Cincinnati-Union Terminal Co., Temple Bar Bldg., steel, concrete mail handling building. $700,000. Waite, Temple Bar Bldg., engr. and archt.

CONTRACTS AWARDED

N. Y., New York—Corporation, c/o H. Siegal, archt., 1775 Bway, reconstructing 6 story, storage, restaurant, to York Building Corp., 151 West 42d St. To exceed $40,000. **Archtect soon lets contract mechanical equipment, plumbing, etc.**



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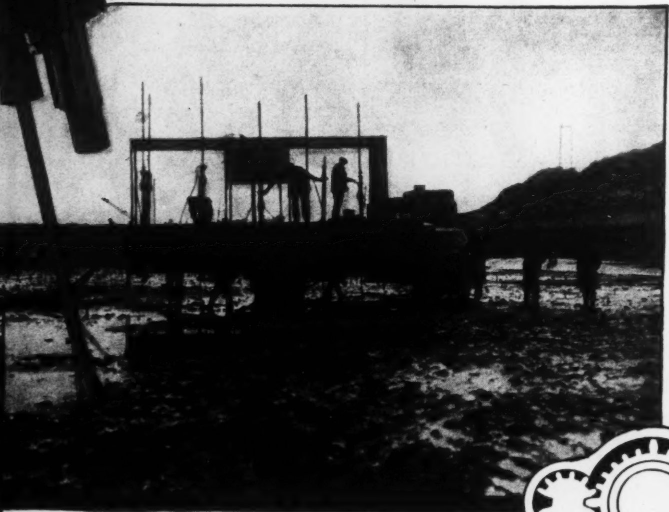

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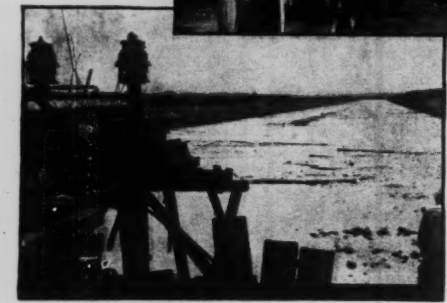

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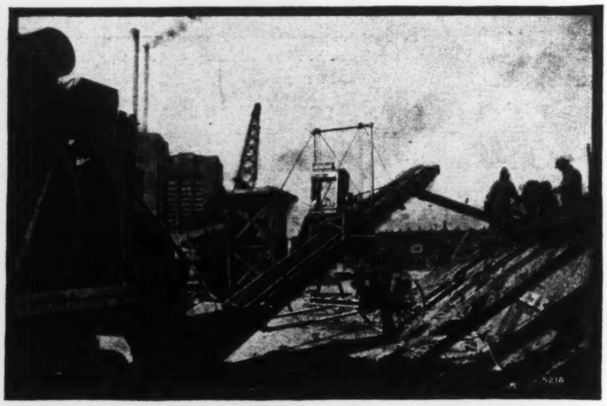

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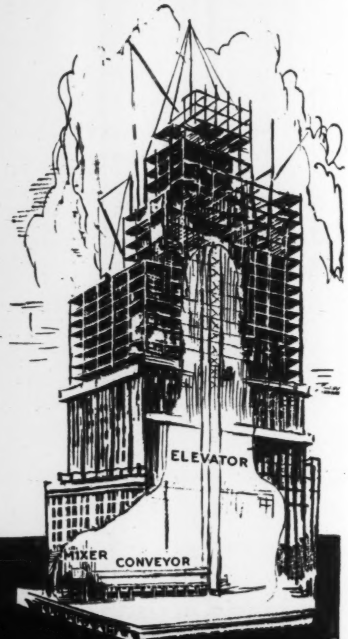

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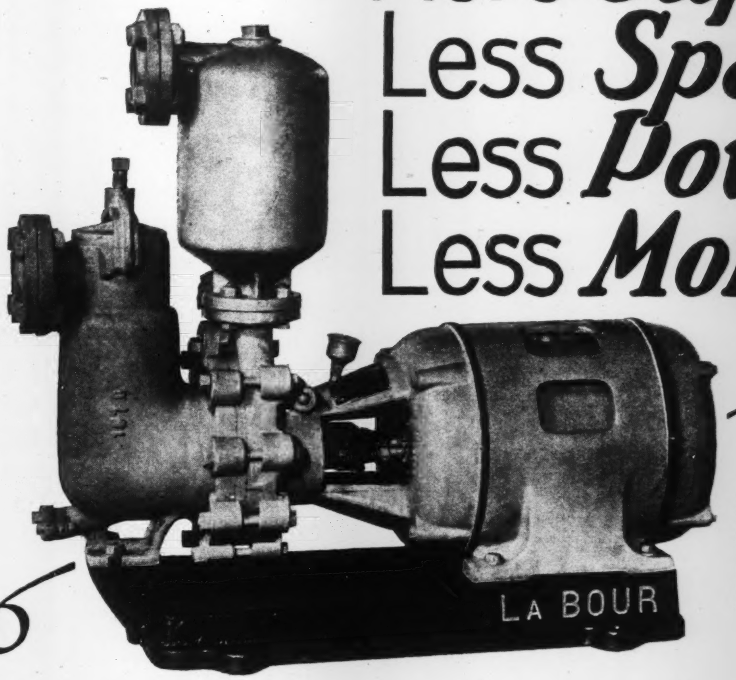

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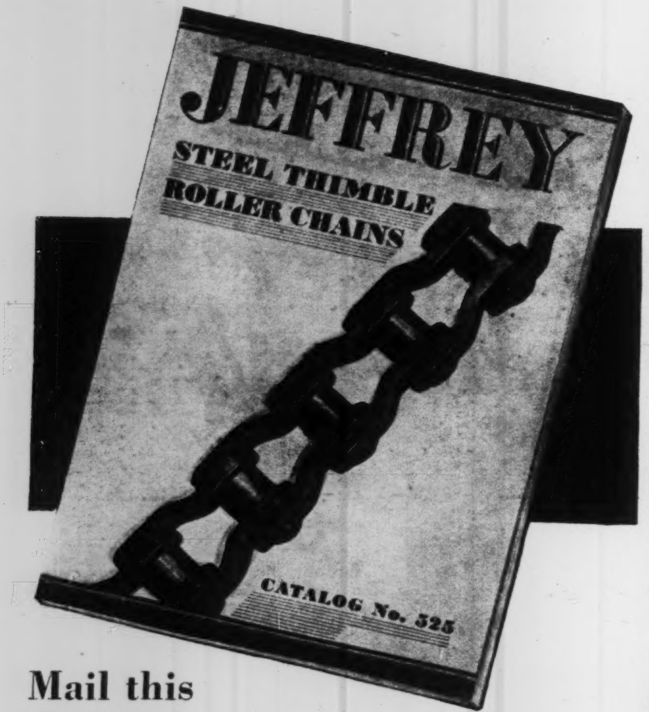

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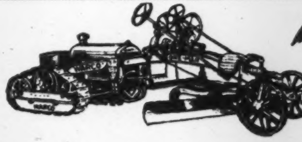

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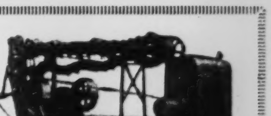

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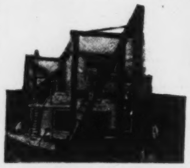

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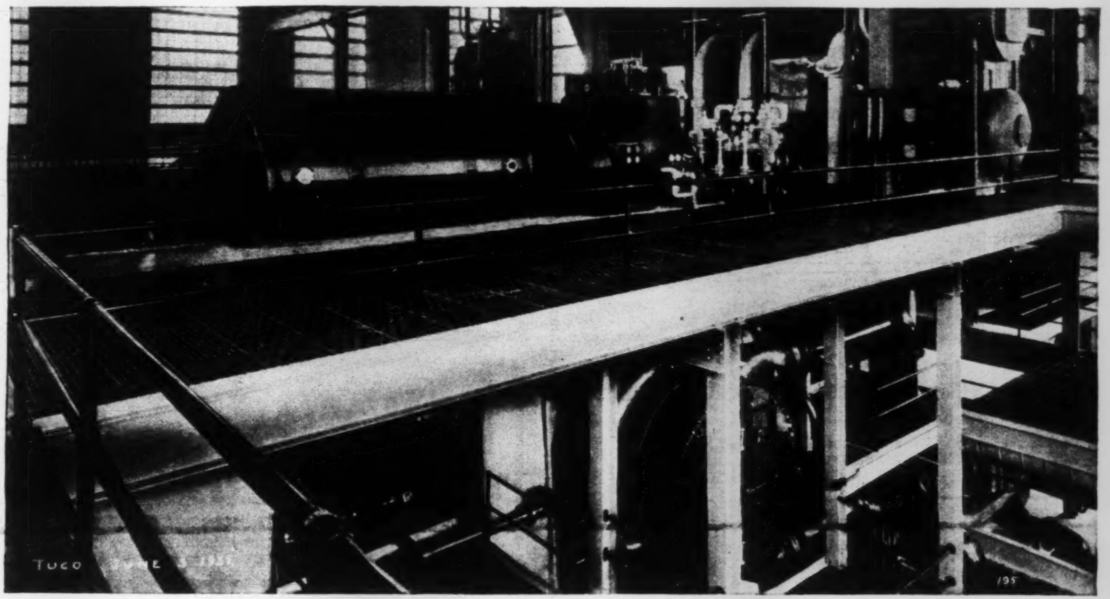

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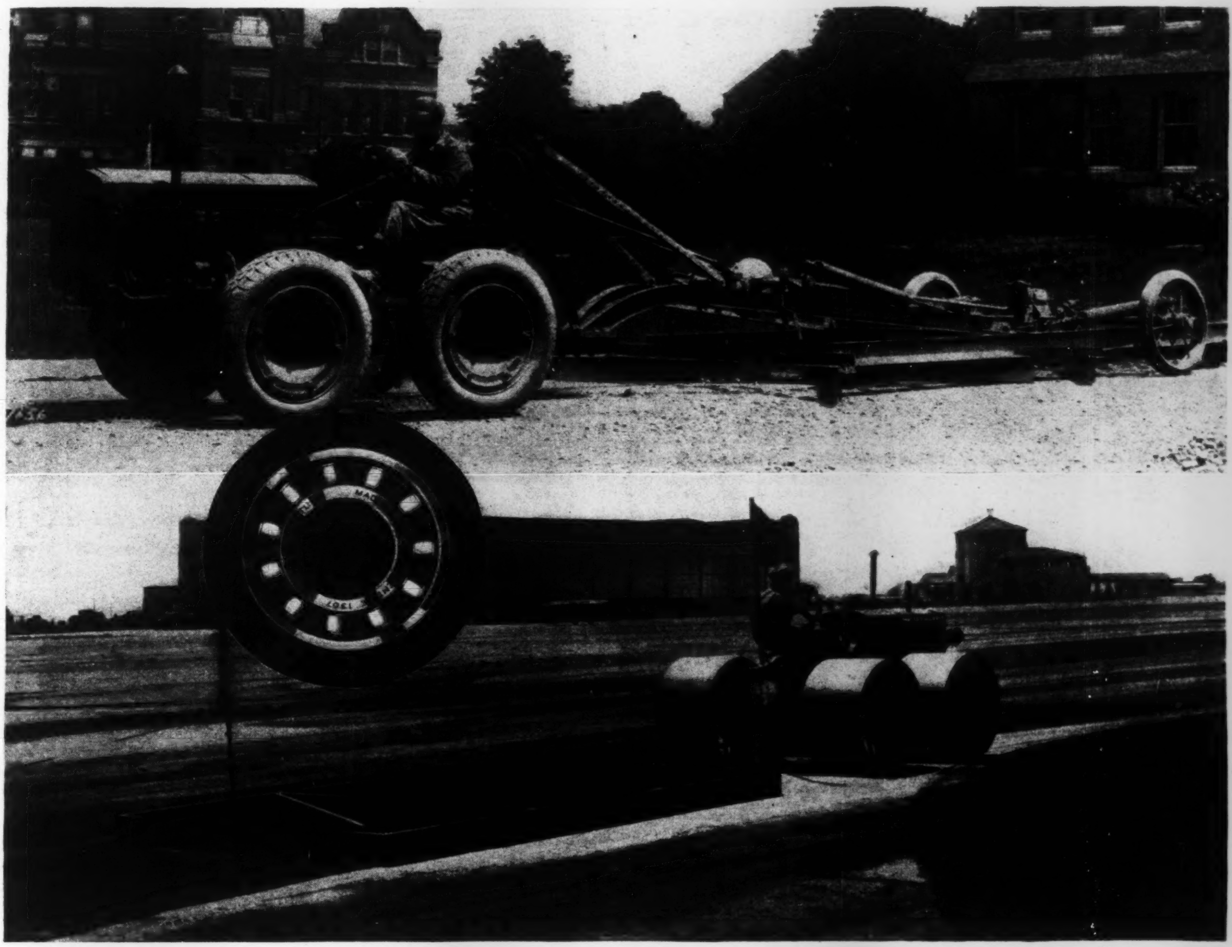

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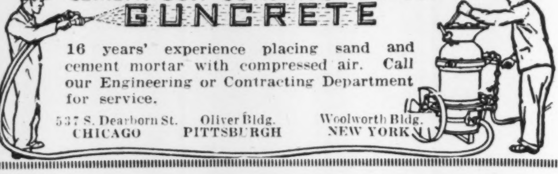

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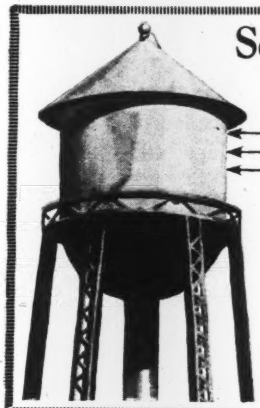

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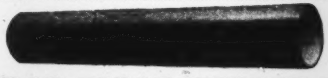

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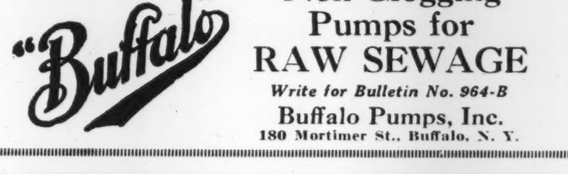

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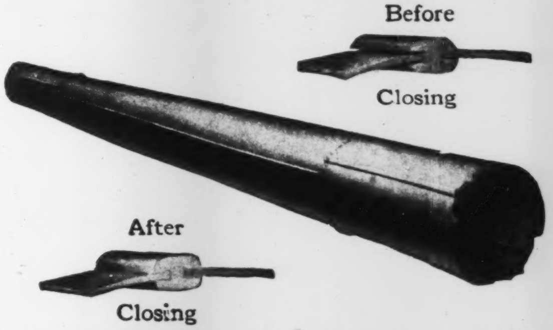

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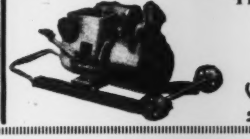

2" *Ejectoprime - - -* Pump $150
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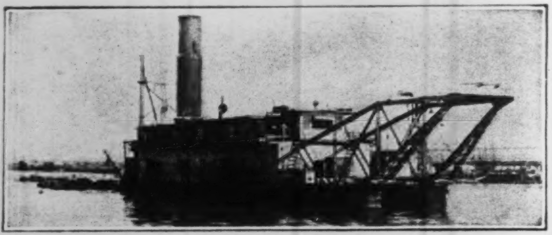

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We are equipped to execute all kinds of dredging, reclamation and port work anywhere in the United States.

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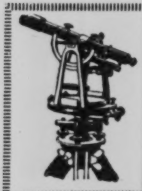

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BUFF & BUFF MFG. CO.
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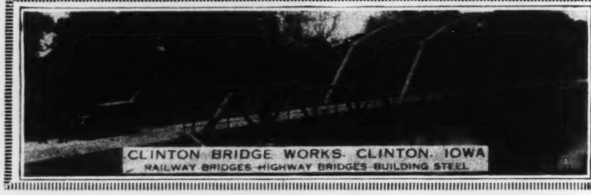

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Shop and Field Welded Steel Buildings

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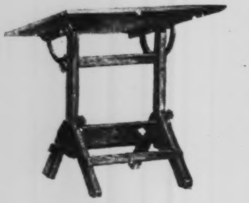

This table is adaptable to any kind of drafting or art work in any horizontal, slanting or vertical position at any height. It is well-made and rigid. Top slides forward or back.

It has a steel ledge on the front edge of board for use in easel work or vertical drafting.

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Steel Buildings, Bridges, Etc.

Virginia Bridge & IRON CO.

Roanoke **Birmingham** **Memphis** **Atlanta**
New York **New Orleans** **Los Angeles**
Charlotte **Dallas** **El Paso**

SEARCHLIGHT SECTION

OFFICIAL PROPOSALS

Copy: Official Proposals reaching our New York Office by 10 A. M., Wednesday can usually be printed in the issue out Thursday. Holidays advance this time one day.

Rate:
40 Cents a Line an Insertion
Fractional lines count as full lines

Plans and Specifications for inspection by distant bidders may be filed at any of the Engineering News-Record offices without charge.

THESE ARE OFFICIAL NOTICES THAT BIDS ARE WANTED FROM BIDDERS EVERYWHERE

E. N.-R.

U. S. Government

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 22, 1931.—Sealed bids in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., January 18, 1932 for furnishing all labor and materials and performing all work for the remodeling and enlarging of the U. S. post office and court house at Cape Girardeau, Mo. The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding one set, may be obtained by any satisfactory general contractor at this office in the discretion of the supervising architect. JAS. A. WETMORE, Acting Supervising Architect. (273)

U. S. ENGINEER OFFICE, Norfolk, Va.—Sealed bids, in duplicate, will be received until 3.00 p.m., Jan. 8, 1932, and then publicly opened, for dredging approximately 23,633 cubic yards of material in Nansemond River, Va. Further information on application. (247)

WAR DEPARTMENT, United States Engineer Office, 39 Whitehall Street, New York, N. Y.—Sealed bids, in duplicate, will be received until 3 o'clock p.m., January 8, 1932, and then publicly opened, for furnishing all labor and materials and performing all work for removal of the sunken and abandoned wreck of Oil Barge "Cecilia M. Dunlap" sunk in the Atlantic Ocean about 3 miles south of the Scotland Light Ship and about 3½ miles off the Sea Bright, N. J., Coast Guard Station. (248)

U. S. ENGINEER OFFICE, FIRST NEW ORLEANS DISTRICT, Poland and Dauphine Streets, New Orleans, La., December 4, 1931. Sealed bids, in duplicate, will be received until 3:00 p.m., January 5, 1932, and then publicly opened for furnishing all labor and materials and performing all work for dredging the Louisiana and Texas Intracoastal Waterway, Mississippi River-Atchafalaya River Section, from Harvy to Bayou Blue, La., comprising approximately 6,554,100 cubic yards, place measurement. Further information on application. (241)

PROPOSALS FOR FRAME HOUSES—U. S. Engineer Office, Cincinnati, Ohio.—Sealed proposals will be received here until 11 a.m. January 20, 1932, and then publicly opened for constructing three, one-story frame lockkeepers' houses. Further information on application. (275)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 21, 1931.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., January 25, 1932, for furnishing all labor and materials and performing all work for the construction of the U. S. post office, etc., at Norman, Okla. The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding three sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (271)

(U. S. Gov. Ads cont'd on page 44)

OFFICIAL PROPOSALS

Bids: January 15.

Removing, Transplanting and Maintaining Trees and Shrubs on Highways

STATE DEPARTMENT OF
PUBLIC WORKS
DIVISION OF HIGHWAYS
Albany, N. Y.

Pursuant to the provisions of Chapter 30, Laws of 1909, Chapter 867, Laws of 1923, Chapter 348, Laws of 1926, and amendments thereto, sealed proposals will be received by the undersigned at the State Office Building, 13th floor, Albany, N. Y., until one o'clock p.m., on the 15th day of January, 1932, for the removing, transplanting and maintaining trees and shrubs on the following highway in Queens County, Contract Number Chap. 567, Laws 1931. Name of Highway, Grand Central Parkway, Sec. 4A, 5 and 6. Deposit Required, $1,500.

Maps, plans, specifications and estimates may be seen and proposal forms obtained at the office of the Division of Highways in Albany, N. Y., and at the office of District Engineer, J. J. Darcy, 116 West Main St., Babylon, N. Y.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specifications and contract agreement.

Proposal for each highway or contract must be submitted in a separate sealed envelope with the name and number of the highway plainly endorsed on the outside of the envelope.

Each proposal must be accompanied by cash, draft or certified check, payable to the order of the New York State Department of Public Works, Division of Highways, for a sum of at least five per centum and not more than six per centum of the estimate accompanying the plans and specifications, and as specified in the advertisement for proposals and the proposal itself. The retention and disposal of such cash, draft or check by the State Division of Highways shall conform with Subdivision 2, Section 130 of the Highway Law, as amended.

The successful bidder will be required to execute the contract and comply in all respects with Section 130 of the Highway Law, as amended.

The right is reserved to reject any or all bids.

A. W. BRANDT,
Commissioner of Highways.

Bids: January 15th, 1932.

Fence

JOINT TREATMENT PLANT
WESTCHESTER COUNTY SANITARY
SEWER COMMISSION

Sealed bids accompanied by a certified check for $500.00 will be received up to 2:00 p.m. Friday, January 15th, 1932, in the Commission's office, Court House Annex, White Plains, N. Y., for furnishing all labor, plant, material and

Construction in 30 calendar days of approximately 1,000 linear feet of woven steel galvanized wire fabric fence and approximately 200 linear feet of rustic wood fence all in Yonkers.

Plans and Specifications, may be seen and obtained after December 28th, 1931, at the office of the Commission also Room 1508, No. 90 West Street, New York City upon the deposit of $10.00.

WESTCHESTER COUNTY SANITARY
SEWER COMMISSION
W. W. YOUNG, Consulting Engineer.
Court House Annex, White Plains,
Dec. 21, 1931. Phone 7780.

OFFICIAL PROPOSALS

Bids: January 8.

Construction and Reconstruction of Highways

STATE DEPARTMENT OF PUBLIC
WORKS, DIVISION OF HIGHWAYS,
ALBANY, N. Y.

Pursuant to Chapter 30, Laws of 1909, Chapter 867, Laws of 1923, and Chapter 348, Laws of 1926, and amendments thereto, sealed proposals will be received by the undersigned at the State Office Building, 13th Floor, Albany, N. Y., until one o'clock p.m. on Friday, January 8, 1932, for the construction and reconstruction of the following highways: Maps, plans, specifications, and proposal forms may be obtained at the office of the Division of Highways, Albany, N. Y., and at the office of J. J. Darcy, District Engineer, 116 West Main Street, Babylon, N. Y.:

NASSAU COUNTY

Contract No.—Chap. 84 L.1929, Chap. 85 L.1930. Type—Concrete. Name—Southern State Parkway, Sec. 4-A, Spur, Pt. 2C, 3A, 4A and approaches. Deposit required, $8,000. Approx. miles—0.82.

QUEENS COUNTY

Contract No.—Chap. 567 L.1931. Type—Grading and structures. Name—Grand Central Parkway, including separation grades at Hollis Court Blvd. and Springfield Blvd. Deposit required — $20,000. Approx. miles—1.61.

SUFFOLK COUNTY

Contract No.—2236. Type—Concrete and Bit. Mac. M.M. Type 4 or 5—Recon. Name—Center Moriches-West Hampton Hwy. 8039. Deposit required — $6,000. Approx. miles—1.00.

Attention of Bidders is called to "General Information for Bidders" in the proposal, specifications, and contract agreement. Proposals must be submitted in separate sealed envelopes with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by cash, draft or certified check, payable to the New York State Department of Public Works, Division of Highways, for a sum of at least five per centum and not more than six per centum of the estimate accompanying the plans, specifications, and as specified in the advertisement for proposals and the proposal itself. The retention and disposal of such cash, draft or check by the State Division of Highways shall conform with Subdivision 2, Section 130 of the Highway Law, as amended. The successful bidder will be required to execute the contract and comply in all respects with Section 130 of the Highway Law, as amended. The right is reserved to reject any or all bids.

A. W. BRANDT,
Commissioner of Highways.

Bids: Jan. 5.

Highway Work

Richmond, Va.

Sealed bids will be received 10 a.m., Tuesday, Jan. 5, 1932 at the office of the Va. Dept. of Highways, State Office Bldg., Richmond, Va. for the construction of:

Proj. Type Mi. Excav. Sq.Yd.
555 Gr. & Dr. 3.3 239,456 & Br. Over Pedlar Riv., Cu.Yds. Conc. 363, lbs. reinf. steel 28,495,658—Br. over Bent Riv.. 3—40 ft. reinf. conc. beam span, cu.yds. A Conc. 289, lbs. reinf. steel 52,060.
719 gravel or Soil Alt. Mac. 4.8 Mi. 91,235. 50,677 Mac. cu.yds. gravel 15,626, soil 15,626 & Br. over Tuckahoe Cr., cu. yds. Conc. 232.9, lbs. reinf. steel 365,656.D.
740 gravel 12,588 3.8 Mi. 39,390 Alt. Mac. 40,831 & br. over Dry Run, Cu.Yds. Conc. 195, lbs. reinf. steel 8,985.

Details obtainable upon request.

OFFICIAL PROPOSALS

Bids: January 11.

State Highway Work

STATE OF NEW JERSEY
STATE HIGHWAY COMMISSION
TRENTON, N. J.

Notice is hereby given that sealed bids will be received by the State Highway Commission for the following three (3) separate contracts.

CONTRACT NO. 58
RT. 25, CONNECTING LINK,
SECTIONS 2 and 3

For the furnishing and placing of concrete for deck slab and sidewalks on highway structure, City of Jersey, and Town of Kearny, County of Hudson. The work involves the furnishing and placing of concrete for deck slab and sidewalks of highway structure between Newark Avenue, Jersey City, and the westerly side of the Hackensack River, Town of Kearny, including surfacing, pavement grading, curbing, drains and railing, and other incidental work. Bids are requested on two alternate types of deck slab construction. The approximate quantities for the one type of deck slab are 9,700 cubic yards of concrete and for the alternate type 7,750 cubic yards. The approximate estimated quantities of some of the other items involved in this contract are as follows:

Wire Rope Railing.....	820 lin.ft.
Embankment	2,200 cu.yds.
Surface Type C.........	4,000 sq.yds.
Granite Curb	2,100 lin.ft.

CONTRACT NO. 60
RT. 25, CONNECTING LINK,
SECTIONS 4A, 4B, 5 and 6

For the furnishing and placing of concrete for deck slab and sidewalks on highway structure, Town of Kearny, County of Hudson, and City of Newark, County of Essex. The work involves the furnishing and placing of concrete for deck slab and sidewalks of highway structure between the westerly side of the Hackensack River in the Town of Kearny, and the westerly side of the Passaic River in the City of Newark, including surfacing, pavement grading, curbing, drains and railing, and other incidental work. Bids are requested on two alternate types of deck slab construction. The approximate quantities for the one type of deck slack are 10,700 cu.yds. of concrete and for the alternate type 8,500 cu.yds. The approximate estimated quantities of some of the other items involved in this contract are as follows:

Wire Rope Railing......	900 lin.ft.
Embankment	1,600 cu.yds.
Surface Type C.........	1,300 sq.yds.
Granite Curb	1,050 lin.ft.

CONTRACT NO. 61
RT. 25, CONNECTING LINK,
SECTIONS, 7, 7A and 8

For the furnishing and placing of concrete for deck slab and sidewalks on highway structure, City of Newark, County of Essex. The work involves the furnishing and placing of concrete for deck slab and sidewalks of highway structure from the westerly side of the Passaic River to a point westerly of the Lincoln Highway, in the City of Newark, including surfacing, pavement grading, curbing, drains and railing, and other incidental work. Bids are requested on two alternate types of deck slab construction. The approximate quantities for the one type of deck slab are 5,000 cu.yds. of concrete and for the alternate type, 4,020 cu.yds. The approximate estimated quantities of some of the other items involved in this contract are as follows:

Wire Rope Railing......	1,700 lin.ft.
Surface Type C.........	2,100 sq.yds.
Granite Curb	1,680 lin.ft.

Bids for the above will be received at the office of the New Jersey State Highway Commission, State House Annex, Trenton, N. J., on Monday, January 11, 1932, at twelve o'clock Noon, and will be opened and read immediately thereafter.

Drawings, specifications and form of bid, contract and bond for the proposed work are on file in the office of the State Highway Department, Trenton, New Jersey, and may be inspected by prospective bidders. Plans will be furnished on a deposit of Ten ($10.00) Dollars upon application to the Jersey City office of the State Highway Department, 921 Bergen Avenue, Jersey City, N. J. Bids must be made on the standard proposal forms in the manner designated in the 1931 standard specifications for State Highways and must be enclosed in sealed special addressed envelopes bearing the name and address of the bidder and work bid upon on the outside, and must be accompanied by a certified check drawn to the order of the Treasurer of the State of New Jersey for not less than ten per cent (10%) of the amount of the bid, provided that the said certified check shall not be less than $500.00 nor more than $20,000.00, and must be delivered at the above place on or before the hour named. Copies of the standard proposal form and special addressed envelopes will be furnished on application. Bids not enclosed in special addressed envelopes will be considered informal and will not be opened. The right is reserved to reject any and all bids.

Each bidder must also accompany his bid with a Statement of Equipment properly filled out.

By order of the State Highway Commission.
A. LEE GROVER,
Chief Clerk.

Bids: January 21.

West Side Sewage Treatment Works—Division DD.

THE SANITARY DISTRICT OF CHICAGO
Chicago, Ill.

Sealed proposals, endorsed, "Proposal For West Side Sewage Treatment Works—Division DD," will be received by the Clerk of The Sanitary District of Chicago at the office of said Sanitary District, Room 600, 910 South Michigan Avenue, Chicago, Illinois, until 1:30 p.m., Standard Time, on Thursday, January 21, 1932, and will be opened publicly by the Board of Trustees of said Sanitary District at a meeting to be held on that day or at the first meeting thereafter.

The work for which tenders are invited consists of furnishing an constructing a sludge filtering and drying unit with sludge concentration tank 35 feet in diameter by 15 feet deep with mechanical thickening mechanism, one vacuum type filter complete with vacuum and sludge pumps and one 96 inch rotary dryer 70 feet long complete, with stoker, brick setting, conveyors, coal and ash handling equipment, piping and all auxiliary apparatus and equipment. The work also consists in furnishing and constructing a steel frame and corrugated sheet iron building approximately 110 feet long by 52 feet wide and 40 feet high for housing the above described plant and a standard gauge railroad siding.

The work is located at the West Side Sewage Treatment Works of The Sanitary District of Chicago, situated south of West Pershing Road and west of South Fifty-second Avenue, in the Village and Township of Stickney, Cook County, State of Illinois.

All bids must be made on blank forms of proposal furnished by the Sanitary District, and shall be made in accordance with and to conform to the terms and conditions set forth in "Requirements for Bidding and Instructions to Bidders" attached thereto.

Specifications, form of proposal and plans may be obtained at said office of said Sanitary District upon deposit of Twenty-five Dollars ($25.00), which sum so deposited will be refunded if the plans and specifications are returned in good condition within 30 days following the opening of the bids.

Each proposal must be accompanied by cash or a cashiers check on a responsible bank doing business in the City of Chicago, to the amount of Fifteen Thousand Dollars ($15,000.00), payable to the order of the Clerk of The Sanitary District of Chicago.

The Board of Trustees of The Sanitary District of Chicago reserves the right to reject any or all proposals.

THE SANITARY DISTRICT OF CHICAGO
By ROSS W. WOODHULL,
Chairman of Its Committee on Finance.
Attest: JAMES J. SULLIVAN, Clerk.
Chicago, December 29, 1931.

Beacon Commissary Corporation

We are prepared to contract for the feeding and housing of men anywhere throughout the United States.

22 South Street, N. Y. City

U. S. Government

(U. S. Govt. ads contd. from page 43)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 22, 1931.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., February 18, 1932, for furnishing all labor and materials and performing all work for the construction (except elevator) of the U. S. post office, court house, jail, etc., at Fairbanks, Alaska. The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor, and provided a deposit of $25.00 is made for each set to assure its prompt return. Checks offered as reposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (276)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 22, 1931.—Sealed bids in duplicate subject to the conditions contained herein will be publicly opened in this office at 3 p.m., January 19, 1932, for furnishing all labor and materials and performing all work for air filters for heating system at the U. S. post office, court house and custom house (old) Milwaukee, Wisc. The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931, (Public No. 798). Drawings and specifications may be obtained from the custodian at the building or at this office in the discretion of the supervising architect. JAS. A. WETMORE, Acting Supervising Architect. (274)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 15, 1931.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., January 19, 1932, for furnishing all labor and materials and performing all work for the construction of the U. S. post office, etc., at Grafton, N. Dak. The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding three sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor and provided a deposit of $15.00 is made for each set to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (261)

PROPOSALS FOR CONSTRUCTING one (1) Air Corps Barracks 357 men will be received at the office of the Constructing Quartermaster at Bolling Field, D. C., until 2:00 o'clock p.m., January 28, 1932, and then opened. Plans and specifications may be had upon application to the above office accompanied by check for Twenty Dollars payable to The Treasurer of The United States. (278)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., December 24, 1931.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., January 25, 1932, for furnishing all labor and materials and performing all work for the construction of the U. S. post office, etc., at Peru, Ill. The prevailing rate of wage shall be paid all laborers and mechanics employed on the project as provided in the Act of March 3, 1931 (Public No. 798). Drawings and specifications, not exceeding three sets, may be obtained at this office in the discretion of the supervising architect by any satisfactory general contractor, and provided a deposit of $15.00 is made for each set to assure its prompts return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (277)

SPECIAL SERVICES
TO CONTRACTORS

We Cut Steel Under Water

Using only ordinary oxygen, hydrogen and compressed air. Complete *Portable Outfits* and skilled operators available at short notice for any thickness or depth anywhere.

Craftsweld Equipment Corporation
250 W. 54th St., New York, N. Y.

SUBMARINE TORCH

Cuts any metal under water. Complete apparatus, skilled operators for any divable depth. 24 hour service.

MERRITT, CHAPMAN & SCOTT CORP.
17 Battery Place, New York City

OFFICIAL PROPOSALS

Bids: January 12.

Completion of Construction Work

SPEC. NO. 6225

Syracuse, N. Y.

Separate sealed proposals covering completion of contract for Construction Work for Forestry Science Building, College of Forestry, Syracuse University, Syracuse, N. Y., in accordance with Specification No. 6225 and accompanying drawings, will be received by the Commission of Education, State Education Building, Albany, N. Y., until 3 o'clock p.m. (Eastern Standard Time) on Tuesday, January 12, 1932, instead of as previously advertised. Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contract. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 80 Centre St., 8th Floor, State Office Building, New York City.

Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y.

District Engineer, 109 N. Genesee St., Utica, N. Y.

District Engineer, Weighlock Building, Syracuse, N. Y.

District Engineer, Barge Canal Terminal, Rochester, N. Y.

District Engineer, 65 Court St., Buffalo, N. Y.

District Engineer, 71 Frederick St., Binghamton, N. Y.

College of Forestry, Syracuse University, Syracuse, N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased from the Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y., upon a payment of $10.00 for each set of drawings and specifications.

There will be no return of the money paid for such drawings and specifications.
Dated: Dec. 22, 1931.

Bids: January 12.

Illinois Waterway Bridge

CONTRACT B 6
DEPARTMENT OF PURCHASES AND CONSTRUCTION

Springfield, Illinois.
December 17, 1931.

Sealed proposals for Contract B 6 covering the substructure and approaches for the Jackson Street bridge, and the substructures of the Cass Street and Jefferson Street bridges, all in Joliet, Illinois, will be received at the Springfield office of the Department until 10:00 a.m. Central Standard Time on January 12, 1932, and then and there, publicly opened and read.

Plans and specifications will be ready and available for bidders December 24, 1931.

For preliminary information, now ready, apply at once to the Division of Waterways, 220 South State Street, Chicago.

OFFICIAL PROPOSALS

Bids: January 11.

State Highway Work

STATE OF NEW JERSEY
STATE HIGHWAY COMMISSION
TRENTON, N. J.

Notice is hereby given that sealed bids will be received by the State Highway Commission for the following three (3) separate contracts:

CONTRACT NO. 55
RT. 25, CONNECTING LINK,
SECTIONS 2 AND 3

For the manufacture, delivery and erection of the steel work required for deck of highway structure, City of Jersey City, and Town of Kearny, County of Hudson. The work involves the manufacture, delivery and erection of the steel work required for the deck of the highway structure between Newark Avenue, Jersey City, and the westerly side of the Hackensack River, Town of Kearny. Bids are requested on two alternate types of steel work. The approximate estimated area of deck to be covered is:

355,000 square feet.

CONTRACT NO. 57
RT. 25, CONNECTING LINK,
SECTIONS, 4A, 4B, 5 and 6

For the manufacture, delivery and erection of the steel work required for deck of highway structure, Town of Kearny, County of Hudson, and City of Newark, County of Essex. The work involves the manufacture, delivery and erection of the steel work required for the deck of the highway structure between the westerly side of the Hackensack River in the Town of Kearny, and the westerly side of the Passaic River in the City of Newark. Bids are requested on two alternate types of steel work. The approximate estimated area of deck to be covered is:

388,000 square feet.

CONTRACT NO. 59
RT. 25, CONNECTING LINK,
SECTIONS 7, 7A and 8

For the manufacture, delivery and erection of the steel work required for deck of highway structure, City of Newark, County of Essex. The work involves the manufacture, delivery and erection of the steel work required for the deck of the highway structure from the westerly side of the Passaic River to a point westerly of the Lincoln Highway, in the City of Newark. Bids are requested on two alternate types of steel work. The approximate estimated area of deck to be covered is:

183,000 square feet.

Bids for the above will be received at the office of the New Jersey State Highway Commission, State House Annex, Trenton, N. J., on Monday, January 11, 1932, at twelve o'clock Noon, and will be opened and read immediately thereafter.

Drawings, specifications and form of bid, contract and bond for the proposed work are on file in the office of the State Highway Department, Trenton, N. J., and may be inspected by prospective bidders. Plans will be furnished on a deposit of Ten ($10.00) Dollars for each project upon application to the Jersey City office of the State Highway Department, 921 Bergen Avenue, Jersey City, N. J. Bids must be made on the standard proposal forms in the manner designated in the 1926 standard specifications for State Bridges and must be enclosesd in sealed special addressed envelopes bearing the name and address of the bidder and work bid upon on the outside, and must be accompanied by a certified check drawn to the order of the Treasurer of the State of New Jersey for not less than ten per cent (10%) of the amount of the bid, provided that the said certified check shall not be less than $500.00 nor more than $20,000.00, and must be delivered at the above place on or before the hour named. Copies of the standard proposal form and special addressed envelopes will be furnished on application. Bids not enclosed in special addressed envelopes will be considered informal and will not be opened. The right is reserved to reject any and all bids.

Each bidder must also accompany his bid with a Statement of Equipment properly filled out.

By order of the State Highway Commission.

A. LEE GROVER,
Chief Clerk.

OFFICIAL PROPOSALS

Bids: January 20.

Construction Work for Reception Building, Etc.

SPEC. NO. 6063

Kings Park, L. I.

Sealed proposals covering Completion of Construction Work for Reception Building, Employees Building, Kitchen and Dining Room Building, and Alterations and Additions to Building No. 2, Kings Park State Hospital, Kings Park, N. Y., in accordance with Specification No. 6063 and accompanying drawings, will be received by The Commissioner of Mental Hygiene, State Office Building, Albany, N. Y., until 2 o'clock p.m., (Eastern Standard Time) on Wednesday, January 20, 1932. Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contract. Drawings and Specifications may be examined free of charge at the following offices:

Commissioner of Architecture, 80 Centre St., 8th Floor, State Office Building, New York City.

Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y.

District Engineer, 109 N. Genesee St., Utica, N. Y.

District Engineer, Barge Canal Terminal, Rochester, N. Y.

District Engineer, Weighlock Building, Syracuse, N. Y.

District Engineer, 65 Court St., Buffalo, N. Y.

District Engineer, 71 Frederick St., Binghamton, N. Y.

Kings Park State Hospital, Kings Park, N. Y.

Proposal blanks and envelopes may be obtained and drawings and Specifications may be purchased from the Commissioner of Architecture, 11th Floor, State Office Building, Albany, N. Y., upon a payment of $10.00 for each set of drawings and Specifications.

There will be no return of the money paid for such drawings and specifications.
Dated: Dec. 23, 1931.

Bids: January 12.

Installation of Safety Gates

DEPARTMENT OF PUBLIC WORKS
STATE OF MARYLAND
STATE ROADS COMMISSION

Baltimore, Md.

Sealed proposals for installation of safety gates as follows:

Dorchester County, Contract No. D-85-17—Complete installation of two safety gates for the bridge over Cambridge Creek at Cambridge, will be received by the State Roads Commission at its offices, Federal Reserve Bank Building, Calvert and Lexington Sts., Baltimore, Maryland, until 12 M. on the 12th day of January, 1932, at which time and place they will be publicly opened and read.

Bids must be made upon the blank proposal form which, with specifications and plans will be furnished by the Commission upon application and cash payment of $1.00 for each separate project, as hereafter no charges will be permitted.

No bids will be received unless accompanied by a certified check, payable to the State Roads Commision of Maryland, as required by Sec. 6, Chapter 539, Acts of 1931, of the amount as set forth in the proposal form.

The successful bidder will be required to give bond and comply with the Acts of the General Assembly of Maryland, respecting contracts.

The Commission reserves the right to reject any and all bids.

By order of the State Roads Commission this 22nd day of December, 1931.

G. CLINTON UHL, Chairman.
L. H. STEUART, Secretary.

Our Best Wishes for A Successful New Year

HARMON V. SWART
ASSOCIATES, INC.
N. Y. City
Newark, N. J

OFFICIAL PROPOSALS

Bids: January 14, 1932.

Construction of Rapid Screen Filtration Plant, Etc.

Lancaster, Pa., Dec. 28, 1931.

Sealed proposals for the construction of Rapid Sand Filtration Plant, Raising of Dam, Screen House, Creek Crossings, Lining and Covering Clear Water Reservoir and other Water Works Improvements will be received by the Mayor in his office, City Hall, Lancaster, Pa., until one o'clock Eastern Standard Time, January 14th, 1932, and not "December 30th, 1931" and then will be opened and read publicly.

Official Proposal Blank, Instructions to Bidders and General Conditions, Specifications, Form of Contract and Bonds, and Plans may be seen at the office of the Superintendent of Water Works, City Hall, Lancaster, Pa., or one copy of each may be obtained by bona fide bidders upon application to The J. N. Chester Engineers, 717 Liberty Ave., Pittsburgh, Pa., one deposit of Twenty-Five ($25.00) which amount will be refunded on receipt of a bona fide bid and return of plans but only Ten Dollars ($10.00) will be refunded to those who do not bid but return plans and specifications in good order within fifteen (15) days after date of receipt of bids.

The right is reserved to reject any or all bids.

CITY OF LANCASTER, PENNSYLVANIA
By: T. WARREN METZGER, Mayor.

THE J. N. CHESTER ENGINEERS,
717 Liberty Ave., Pittsburgh, Pa.

OFFICIAL PROPOSALS

Bids: February 5th, 1932.

Westchester County Treatment Plant Dock

Sealed bids; accompanied either by a certified check for $10,000 subject to being cashed, or by a similar forfeit deposit of $2,000 with an affidavit of satisfactory competency in prescribed form; will be received up to 2:00 p.m., Friday, February 5th, 1932 in the Supervisors Chambers, Court House, White Plains, N. Y. for the enduring

Construction in 90 calendar days of Section G, Sawmill, North and Central Yonkers Projects comprising about 400 linear feet of Dock on piles, complete with all appurtenances; located on or near Alexander Street, Yonkers.

Plans and Specifications, Invitation to Contractors, forms for Bids, certificate of competency, Contract and Bond may be obtained on or after Jan. 21st, 1932, at the Commission's office and at room 1508, No. 90 West Street, New York City, upon deposit of $20.00.

WESTCHESTER COUNTY SANITARY
SEWER COMMISSION
W. W. YOUNG, Consulting Engineer.
Court House Annex, White Plains,
December 21, 1931. Phone 7780.

YOU GET national competition on your request for bids in the Official Proposal Columns of ENGINEERING NEWS-RECORD

The Biggest Step to 100% Efficient Service

you can take is to have your call for bids appear in the

Official Proposal Columns of Engineering News-Record

It insures maximum competition, lower bids, better work—and a saving in dollars and cents that can be applied on other work.

0308

THE Ætna's nationwide organization assures a prompt bonding service wherever needed.

ÆTNA CASUALTY & SURETY COMPANY
Hartford, Conn. CONTRACT BONDS FOR RESPONSIBLE CONTRACTORS Agents Everywhere

Why?

WHY do Government regulations specify that contracts for construction, equipment and supplies over a certain minimum amount must be advertised?

WHY do the laws of most States and Municipalities specify the same thing?

WHY do so many private corporations advertise **their** big contracts?

WHY do Consulting Engineers, Architects, and others recommend and endorse the advertising of Contracts To Be Let?

And—

WHY are 90% of the advertisements on which **real national competition** is desired published in **ENGINEERING NEWS-RECORD**?

In the answers to the foregoing questions you will find unquestionable proof that

1—**Advertised Contracts** are the accepted form of public letting to insure the awarding of contracts free of prejudice.

2—**Advertised Contracts** guarantee the greatest possible saving through maximum competition and that—

3—ENGINEERING NEWS-RECORD is universally recognized as the one dominant medium of national circulation for advertising Contracts To Be Let.

Are your contracts advertised?
Are they advertised in ENGINEERING NEWS-RECORD?
If not—WHY?

0128

EMPLOYMENT

AND OTHER BUSINESS OPPORTUNITIES

Positions Wanted. 5 cents a word. minimum charge $1.00 an insertion.
Positions Vacant and all other classifications. 10 cents a word. minimum $2.

Box Numbers in care of our New York. Chicago or San Francisco offices count as 10 words in addition to advertising copy.

Replies are forwarded each day as received at each of the offices mentioned without additional charge.

Discount of 10% is allowed if full payment is made in advance for 4 consecutive insertions.

THE ABOVE RATES ARE FOR ADVERTISEMENS SET UNDISPLAYED. FOR DISPLAY RATES SEE "USED EQUIPMENT" HEADING
COPY FOR NEW ADVERTISEMENTS RECEIVED UNTIL MONDAY FOR THURSDAY'S ISSUE. E.N.-R.

OTHER WILSON COURSES:

- *Reinforced Concrete Engineering*
- *Structural Drafting*
- *Structural Steel Designing*
- *Structural Engineering*
- *Bridge Engineering*
- *Arc-Welded Structures*

20th YEAR

STRUCTURAL DRAFTSMEN

have before them the open road to the highest executive positions in the steel industry. And—

IN NORMAL TIMES

the demand for trained structural draftsmen has always exceeded the supply. Before construction work dwindled to its present dwarfed proportions this page of the Searchlight Section regularly published more "Positions Vacant" for structural draftsmen than for all other kinds of engineering employment. When construction again takes a start, structural draftsmen will be—

STEADILY EMPLOYED

Prepare *NOW*. Our course is complete, practical and thorough. Given by mail only. Write today.

Wilson Engineering Corporation
College House Offices, Harvard Square, Cambridge, Mass., U.S.A.

Correspondents Wanted IN THESE CITIES

To report new construction projects of the following costs or more: $15,000 for waterworks, drainage, river and harbor work; $40,000 for industrial buildings; $150,000 for other buildings; $25,000 for all other structures including public works and utilities. State confidentially your present connection and such other information as will help make us acquainted with you.

A. W. WELCH
Engineering News-Record
330 West 42nd Street, New York

Arizona
- Tucson

Arkansas
- Fort Smith
- Hot Springs
- Pine Bluff
- Texarkana

Colorado
- Colorado Springs

Connecticut
- Hartford

Florida
- Jacksonville
- Miami
- Orlando
- Pensacola
- Tampa
- West Palm Beach

Georgia
- Augusta
- Columbus
- Macon
- Savannah

Illinois
- Aurora
- Bloomington
- Chicago
- Danville
- Decatur
- Elgin
- Quincy
- Rock Island
- Waukegan

Indiana
- Elkhart
- Fort Wayne
- Gary
- Hammond
- Kokomo
- Lafayette
- Michigan City
- Muncie
- New Albany
- Richmond
- South Bend
- Terre Haute

Iowa
- Cedar Rapids
- Clinton
- Council Bluffs
- Dubuque
- Ft. Dodge
- Madison
- Keokuk
- Sioux City
- Ottumwa
- Waterloo

Kentucky
- Ashland
- Lexington
- Newport
- Owensboro
- Paducah

Louisiana
- Monroe
- Shreveport

Maine
- Bangor
- Lewiston

Maryland
- Hagerstown

Michigan
- Ann Arbor
- Battle Creek
- Port Huron

Mississippi
- Jackson

Missouri
- Joplin
- Springfield

Montana
- Great Falls

Nebraska
- Omaha

New Hampshire
- Manchester
- Nashua
- Berlin
- Portsmouth

New York
- Long Island towns
- Amsterdam
- Auburn
- Elmira
- Geneva
- Hornell
- Jamestown
- Kingston
- Mount Vernon
- Newburgh
- New Rochelle
- Olean
- Poughkeepsie
- Rochester
- Rome
- Schenectady
- Utica
- Watertown
- Yonkers

North Carolina
- Asheville
- Elizabeth City
- High Point
- New Bern
- Rocky Mount
- Wilmington
- Winston Salem

North Dakota
- Fargo

Ohio
- Lima
- Middletown
- Norwood

Oklahoma
- Enid
- Miami

Pennsylvania
- Altoona
- Chester
- Easton
- Hazleton
- Johnstown
- Lebanon
- Nanticoke
- Sharon
- Wilkinsburg
- Williamsport
- York

Rhode Island
- Central Falls
- Cranston
- Newport
- Pawtucket
- Woonsocket

South Carolina
- Greenville

South Dakota
- Sioux Falls

Texas
- Beaumont
- Corpus Christi
- Galveston
- Houston
- Laredo
- Port Arthur
- San Angelo
- Waco
- Wichita Falls

Virginia
- Lynchburg
- Newport News
- Petersburg
- Portsmouth
- Roanoke

Washington
- Bellingham
- Everett
- Spokane
- Tacoma

West Virginia
- Clarksburg
- Huntington
- Parkersburg

Wisconsin
- Eau Claire
- Green Bay
- Kenosha
- La Crosse
- Oshkosh
- Racine
- Sheboygan
- West Allis

Canada
- New Brunswick
- Manitoba

POSITIONS VACANT

ENGINEER wanted. Experienced in design of contractor's equipment used on road construction. State experience and salary expected P-786. Engineering News-Record, 330 West 42d St., New York.

EMPLOYMENT SERVICE

IF YOU are qualified for position between $2,500 and $25,000 and are receptive to negotiations for new connection, your response to this announcement is invited. The undersigned provides a thoroughly organized service, established twenty-two years ago, to conduct confidential preliminaries, and assist the qualified man in locating the particular position he desires. Not a registration bureau. Retaining fee protected by refund provision, as stipulated in our agreement. Send name and address only for description of service, R. W. Bixby, Inc., 272 Main Street, Buffalo, New York.

CONSTRUCTION managers, superintendents, sales managers, sales engineers, comptrollers, treasurers have for thirteen years engaged us. Individual. Confidential. Jacob Penn, Incorporated, 535 Fifth Avenue, New York.

POSITIONS WANTED

Superintendents

SUPERINTENDENT, construction engineer graduate, married with thirteen years' constructruction, design, office experience on industrial plants, municipal and harbor work. Recently completed large concrete building in New Jersey. Go anywhere. PW-777, Engineering-News Record, 330 West 42d St., New York.

Miscellaneous

ENGINEERING and construction executive, 35, experienced complete charge engineering and construction bridges, dams, power plants, waterworks, etc. Go anywhere. Available now. PW-785 Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

EXPERT mechanic, gasoline engines used in conjunction with contractors equipment, extensive field service experience, maintenance. Have service truck and tools. Will travel for manufacturers or contractor. PW-778, Engineering News-Record, 330 West 42d St., New York.

GRADUATE mechanical engineer with extensive experience in operation, maintenance, and supervision of mechanical equipment. Three years' experience sales engineering. Also experienced lubrication engineer. PW-780, Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

YOUNG man, 31, 3-year C.E. course, 9 years as structural and ornamental draftsman. Past year as engineering inspector. Earnest and efficient worker. PW-783, Engineering News-Record, 330 West 42d St., New York.

REPRESENTATIVES AVAILABLE

Established Representatives in New York City
Desire to handle another account of a Western manufacturer of municipal and contractor's equipment. Correspondence solicited. RA-784 Engineering News-Record, 330 West 42d St New York.

PATENT ATTORNEYS

PATENTS—Personal services assured by member of firm. Information and booklet free. Lancaster, Allwine & Rommel, Suite 432 at 815 15th St., Washington, D. C.

FOR SALE

FOR SALE: Engineer's office instruments and library. Inspection invited. FS-782, Engineering News-Record, 330 West 42d St., New York.

USED EQUIPMENT

AND NEW, OFFERED FOR RE-SALE, FOR RENT or WANTED

Space for these advertisements is sold by the advertising inch—30 inches to a page. The price per inch is based on total space used—multiply ad space by number of insertions.

RATE PER INCH

1 to 3 inches	$6.00 an inch
4 to 7 inches	5.75 an inch
8 to 14 inches	5.50 an inch

Rates for larger spaces, or space on a yearly basis, furnished on request.

An inch is measured vertically on one column—three columns to a page. Any space may be used measured by the even inch in height by 1, 2, or 3 columns in width.

ADVERTISEMENTS OF EQUIPMENT FOR SALE RECEIVED TOO LATE FOR LOCATION ON THE FOLLOWING PAGES ***appear on the page or two preceding as do also advertisements of Equipment Wanted and For Rent.***

FOR SALE

P. & H. MODEL 206 GAS CRAWLER DRAGLINE, 45 FT. BOOM, FULL ENCLOSED STEEL CAB, ¾-YD. BUCKET.

Byers, 10 Tons Capacity, Full Revolving, Crawler, **Steam Crane** 40 Ft. Boom.

12-Yard **Western** Heavy Duty, Steel Beam Type, 2-Way, **Dump Cars,** 19-Ft. Beds, NEW BODIES.

The above completely rebuilt and we can offer at an unusual bargain.

Have Large Assortment Modern Locomotives, Steam and Gas Shovels, Rails, etc.

SOUTHERN IRON & EQUIPMENT CO.
Atlanta, Ga.

FOR SALE

DREDGES and FLOATING EQUIPMENT

H. P. GUION
303 West 42nd St., New York City
Tel. Penn. 6-4134

Shovels or Cranes

FOR SALE

1—Factory rebuilt Lima 1¼ cu.yd. capacity. This machine can be equipped with either **shovel**, clamshell, dragline or drag **shovel** attachments. Very reasonably priced. Carries new machine guarantee. Located at Newark.

1—GA-2 Erie Gas Air Shovel. Fine condition and bargain. Located Newark, N. J.

General ½-yd. combination shovel, backhoe, 2 buckets, and crane boom. Very good condition, located Long Island.

1—Type B Erie Shovel or Clamshell machine, good condition. Located Newark, N. J.

Complete Shovel Attachment for Type "O" Thew. Also, attachment for Type B and B-2 Eries located in New Jersey. Decided bargains.

1—P & H 1¼ yd. Gas Shovel. Excellent condition, very attractive price. Located Newark, N. J.

1—Linn Tractor, 6-yd. capacity, with Waukesha Motor. Machine in very good condition. Priced to sell quickly. Located New York State.

Koehring ¾ yd. Shovel. Excellent condition throughout. Located Newark, N. J.

LIMA EXCAVATOR SALES AGENCY

Lima, O., Office:
Lima Trust Bldg.
Tel. Main 4824

Eastern Offices and Warehouse:
317 Frelinghuysen Ave.,
Newark, N. J.
Tel.: Waverly 2-0640

Wire or phone nearest office at our expense.

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FOR SALE OR RENT

CONTRACTORS EQUIPMENT

B. M. WEISS
1324 Widener Building, Philadelphia, Pa.
Tel. Rittenhouse 2311

FOR SALE

CRAWLER HOE

Browning ½-yd., with 25-ft. Crane Boom and ½-yd. Clamshell Bucket. Will pass any inspection.

HOISTING MACHINERY CO.
50 Church St., New York
Cortlandt 7-1992

Sand and Gravel Plants

2—Complete electrically equipped Plants, 500 and 800 tons capacity, 90% new condition, with Sauerman electric Slackline and Drag Scraper Units.

Diesel Fuel Oil Engines

Capacities 75 hp. to 950 hp. with or without generators, all modern, some new, bargain prices.

We will pay cash for modern equipment, in unquestionable condition, for contractors, Sand and Gravel Plants, Stone Crushing Plants, etc.

A. J. O'NEILL CO.
1524 Chestnut St., Philadelphia, Pa.

1—40-ton **Saddle Tank Vulcan Locomotive,** A.S.M.E.
1—220-ft. **Portable I.R. Compressor.**
1—**Browning ⅝-yd. Shovel** with 35-ft. **Crane Boom.**
1—**Link-Belt K-35,** with 45-ft. Boom, ¾-yd. Bucket.
1—**Ohio 35-ton d.d. Loco. Crane,** A.S.M.E., 50-ft. Boom.
1—**Ohio 25-ton d.d. Loco. Crane,** A.S.M.E., 50-ft. Boom.
1—**Ohio 25-ton s.d. Loco Crane,** A.S.M.E., 50-ft. Boom.
2—**Industrial 25-ton d.d. Electric Cranes,** 50-ft. Booms.

I buy and sell all kinds of equipment. Send me your inquiries.

HARRY C. LEWIS
156 Market St., Newark, N. J.
Mitchell 2-3249

AIR COMPRESSORS

ALL TYPES AND SIZES

BOUGHT, SOLD AND EXCHANGED

Let us quote on your requirements.

Send us details of your surplus.

EARL E. KNOX CO., Ariel Bldg., Erie, Pa.

BARGAINS

SALE OR RENT

Construction equipment, rollers, graders, crushers, elevators, loaders, etc.

Send for List

JOHNSON & HOEHLER
Fernwood, Del. Co., Penna.

WAUKESHA MOTORS

20—Waukesha Heavy-duty "WS" series four cylinder, 80-100-120 hp. Like new—guaranteed. $950.00 each.
4—Late type Caterpillar Tractors, 30 and 60. Cheap.
1—P. & H., ¾-yd. capacity, full caterpillar electric crane, A No. 1 condition. Cheap.

MERTES MACHINERY COMPANY
1622 So. First St., Milwaukee, Wis.

General Crane, 35-ft. boom.
30—4-yd. **Hvy. Steel Stone Skips.**
5- and 10-ton **Buff. Spr. Gas Rollers.**
½-yd. **General Shovel Attachment.**
8- and 10-ft. Blade **Power Graders.**
4¼x5 **New Motor for Al. Ch. Tractor.**

J. T. WALSH
500 Brisbane Bldg., Buffalo

WAGONS

LaPlante Choate dump wagons, all at present time mounted on 4 steel wheels, but each wagon with extra set caterpillar wheels; complete with steel axles to convert above to caterpillar wagons; 2-size capacity at level 3 cu.yds. or 8 tons; weight 5800 lbs. ea. Capacity at level 4½ cu.yd. or 10 tons; weight 6900 lbs. each. Stroud Little Red Wagons; capacity 2 cu.yd. front wheels 38 in. dia., rear wheels 46 in. dia., length 10 ft., width 54 in. Weight with brakes 2100 lbs., weight without brakes 2000 lbs.

AIR TOOLS

Ingersoll-Rand and Gardner Denver concrete breakers, air spades and jack hammers.

PUMPS

Barnes centrifugal pumps, from 10 in. suction down to 2 in. suction; all direct connected to Hercules, LeRoi and Fuller and Johnson gasoline engines; also a number of Barnes belt driven centrifugal pumps, from 10 in. suction down to 3 in. suction.

Boat Load

Brand New
Equipment
in original crates
FOR SALE
at
USED EQUIPMENT
PRICES
We have just brought
in
BOAT LOAD
Equipment from CUBA
consisting of :

SCRAPERS

A number of Killefer Reynolds scrapers, Model 7H, capacity 21 cu.ft., bucket, 7 ft. wide x 14 in. high, loading and unloading automatic adjustable for complete or incomplete load; all steel; Size 7J, capacity 40 cu.ft., bucket 7 ft. wide x 20 in. high, loading and unloading automatic adjustable for complete and incomplete loading, all steel; Killefer backfillers, size No. 2, 2-ton capacity; for use with diggers; oscillating blade 8 ft. x 18 in., direct control by tractor operator; weight 1885 lbs. each.

CONCRETE MIXERS

Various sizes, equipped with LeRoi engines; also mortar mixers, similarly equipped.

TRAILERS

Martin 8-wheel high speed flexible wagons; capacity 15 tons, with steel tired wheels, 36 in. dia. with ⅝ in. x 6 in. tires. Russell Machinery Carriers, size No. 11. All steel, with 2 steel wheels.

EQUIPMENT CORPORATION OF AMERICA

Pittsburgh, Pa.
855 Empire Bldg.
Phone: Grant 6100

Chicago, Ill.
1155 S. Washtenaw Ave.
Phone: Seeley 5100

Philadelphia, Pa.
Suite 1155—Broad St. Station Bldg.
Phone: Rittenhouse 6100

TO SETTLE ESTATE!

The following equipment will be sold at a price warranting your

IMMEDIATE ATTENTION

1—Multifoote Paver 27-E.
1—Small Lakewood concrete Mixer.
1—Screed Machine.
1—Linn Tractor.
1—Air Compressor (Ing.-Rand).
1—Water Pump (C.H.&E.)
1—10-ton Steam Roller.
1—Gasoline Roller (McCormick Deering).
1—Cletractor Bulldozer.
2—Baker Scrapers.
1—Power Sewer Pump.
1—Drill Sharpener.
1—Batch Bin.
3—Miles Road Forms.
5—Miles Cast Iron 2-in. Pipe.
2—Jackhammers.

A. M. CARCHIA

Box 385, Stottville, N. Y.

SACRIFICE SALE

2—250 H.P. Manning Vertical Tube Boilers Nos. 428 and 429 (N. Y. State Nos.), Fittings, etc.

1—75-hp. and 1—50-hp. Horizonal Tube **Boiler.**
1—**Well Pump**—the Deming Co., Salem, Ohio, Fig. 62, Size 24, No. 9716, with Water Tank.
1—**LeRoi Engine** No. 5061-0.
1—**Steam Pump,** Geo. Blake, (N. Y. and Boston) 7x5x10, No. 143295x6.
1—**Steam Pump,** Worthington 6x4x6, No. 642372.

What do you offer?

Mª SHAPIRO & SON

1560 Broadway, New York City

Check HAISS As Your Source of GOOD FACTORY REBUILT EQUIPMENT

Factory Rebuilt Clam Shell Buckets

1—Hayward 1½-yd. Bucket.
1—Haiss 1½-yd. "Contractor" Type Bkt.
1—Haiss 1-yd. "Hi-Power" Type Bucket.
1—Haiss 1-yd. "F-F" Bucket.
1—Haiss ¾-yd. "Contractor' Bucket.
1—Haiss ¾-yd. "Hi-Power" Bucket.
1—Haiss 2½-yd. "Hi-Power" Bucket.

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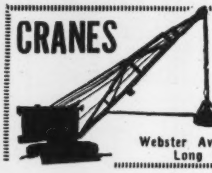

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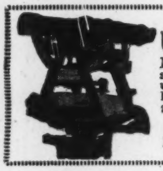

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(Top) Section of Bagley Street in the heart of Detroit, paved with TEXACO Sheet Asphalt.

(Left) Traffic on Livernois Street, Detroit, rides quietly and smoothly over TEXACO Sheet Asphalt.

(Right) Another Detroit thoroughfare, Lafayette Street, which is paved with TEXACO Asphalt.

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